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BUREAU OF MINES MINERALS YEARBOOK

The Mineral Industry of Other Areas of the Far East and South Asia

UNITED STATES DEPARTMENT OF THE INTERIOR

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The Mineral Industry of Other Areas of the Far East and South Asia

By E. Chin, Gordon L. Kinney, Chin S. Kuo, and Travis Q. Lyday

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BANGLADESH[1]

Natural gas was Bangladesh's only significant exploited mineral. A few other minerals or mineral-based commodities were produced for local consumption. The most valuable were nitrogen fertilizer, salt, cement, and clay for brick.[2] The most important mineral industry development of 1987 was the start of modest production of crude oil, the first discovered and produced in the country.

PRODUCTION AND TRADE

Production of natural gas from the nation's huge reserves continued to increase but was limited by the lack of residential and industrial demand. Gas reserves of 7 trillion to 16 trillion cubic feet were sufficient for far more production than the country could efficiently utilize for many years. The country's consumption-to-reserves ratio was one of the lowest of the developing nations. Mineral exports have been insignificant, comprising a small amount of nitrogen fertilizer. Nitrogenous fertilizer exports could become important when planned new capacity comes onstream. Mineral imports were dominated by crude petroleum.

COMMODITY REVIEW

Industrial Minerals.—*Fertilizer Materials.*—Chittagong Urea Fertilizer Ltd. began commercial production at its new plant late in the year. The plant was constructed by Toyo Engineering Corp. of Japan and has a capacity of 330,000 tons per year of ammonia and 561,000 tons per year of urea (258,000 tons nitrogen content). Completion of the Chittagong plant brings Bangladesh's capacity to 1.6 million tons of urea per year from five natural-gas-based plants.

At yearend, Bangladesh began modest exports of bagged urea to Sri Lanka and East Africa. The shipments were part of a 90,000-ton commitment to local and international trading companies.

Two additional 561,000-ton-per-year urea

plants were in the planning stage, Karnaphuli Fertilizer Co. Ltd. at Chittagong and Jamuna Urea Fertilizer Ltd. at Jagannathganj, Jamalpur.[3]

Limestone.—The United Nations Development Program and the Asian Development Bank are planning a comprehensive survey of the country's limestone resources to establish enough new reserves to justify an increase in cement production capacity. Exploratory drilling will be conducted at four or five of the most promising sites in Sylhet and Sunamganj Districts. If enough cement quality limestone is confirmed, the Chhatak Cement Co. Ltd. and Surma Cement Co. plants would be expanded in the early 1990's.

Salt.—Bangladesh Government officials reportedly stopped importing salt because the nation became self-sufficient for the first time in 1986. Salt production was 150,000 tons higher than domestic demand in 1987. All salt was produced from seawater evaporation ponds.

Mineral Fuels.—*Coal.*—The Bangladesh Government continued planning the development of coal deposits discovered in 1985 in the Dinajpur and Rangpur Districts of the energy-poor northwest. A development proposal by The Broken Hill Pty. Co. Ltd. of Australia was being studied. The Government favored a production sharing agreement for the $500 million project, with the consortium responsible for all expenses. A considerable effort will still be necessary to delineate the reserves and engineering parameters. The coal would be used for electric power generation and by the brick industry.

Petroleum.—After the December 1986 oil discovery in the Haripur Gasfield of the Surma Basin by the Bangladesh Oil, Gas, and Mineral Corp. (BOGMC) the well was put into immediate production. The 300 to 400 barrels per day of waxy, low-sulfur crude was carried 20 kilometers by truck to Sylhet then 300 kilometers by rail to the refinery at Chittagong. To develop the field as rapidly as possible, Bangladesh Ministry of Energy officials signed a 25-year oil production sharing agreement with Scimitar Oil Ltd. in December. Under terms of the agreement Scimitar Oil was granted exclusive exploration and development rights in the Surma Basin. A minimum of three wells must be drilled during 1988-89. Scimitar Oil was allowed a 3- to 4-year cost recovery period at 40% of production for the first year and decreasing levels thereafter. After that, Scimitar Oil's share of production would decrease proportionally as production rises. At the maximum extraction rate, the Bangladesh Government would receive 90% of production. Scimitar Oil was solely responsible for the capital investment cost but may withdraw from the agreement without compensation if it determined there is insufficient oil.

In September, BOGMC reported a second oil discovery in the Surma Basin at Fenchuganj well No. 2. Oil was struck at a depth of 3,068 meters, below known natural gas horizons. The well tested 1,200 barrels per day of 17.2° API high wax, low-sulfur crude. Additional testing was under way to determine if the discovery was commercially exploitable.[4]

Oil from these fields should reduce Bangladesh's crude oil and refined product's import cost, which has been as much as $300 million annually.

The Bangladesh Shell Petroleum Development Co. was to begin its first drilling in Bangladesh early in 1988. This comes after 8 years of geophysical work interrupted by tribal hostilities. One well will be drilled near Shalbanhat, 10 kilometers from the Indian border and the second is planned for the Sitapahar area in the Chittagong Hills. Shell had been the only foreign oil operator working in Bangladesh before the Scimitar Oil negotiations.

The Government hoped to conclude additional oil exploration agreements following preparation of promotional packages by a consultant under a World Bank funded hydrocarbon habitat study. The promotional packages were nearly ready at yearend.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area and commodity	1983	1984	1985	1986[p]	1987[e]
BANGLADESH[2]					
Cement, hydraulic[3]	306,688	272,619	240,176	e292,000	310,000
Clays: Kaolin[3]	2,269	2,613	4,178	2,695	4 12,272
Gas, natural, marketed[3 5] million cubic feet	70,133	80,257	90,958	101,138	4 135,165
Iron and steel: Metal:[3]					
Steel, crude (ingot only)	47,401	73,387	101,419	95,514	4 82,081
Steel products	54,552	100,741	126,582	111,593	4 129,986
Nitrogen: N content of ammonia and ammonium sulfate	178,695	352,888	358,480	390,515	4 435,900
Petroleum refinery products: thousand 42-gallon barrels	7,168	7,958	7,357	7,405	7,610
Salt, marine[3]	243,091	671,832	489,000	e500,000	416,000
Stone: Limestone, industrial[3]	32,101	24,564	40,392	22,082	4 41,660
BRUNEI[2]					
Gas, natural:					
Gross million cubic feet	352,000	e330,000	e330,000	e320,000	325,000
Marketed do	e315,000	e300,000	307,645	284,565	300,000
Natural gas liquids:[6]					
Condensate thousand 42-gallon barrels	5,910	5,460	5,500	5,400	5,500
Natural gasoline do	305	280	300	290	300
Liquefied petroleum gas do	125	115	110	100	100
Total do	6,340	5,855	5,910	5,790	5,900
Petroleum:					
Crude do	63,875	58,560	54,300	59,860	56,000
Refinery products:					
Gasoline do	553	605	600	e600	650
Distillate fuel oil do	358	395	400	e400	450
Residual fuel oil do	7	8	8	e10	10
Other including refinery fuel and losses do	250	272	300	e300	350
Total do	1,168	1,280	1,308	e1,310	1,460
CAMBODIA[e 2]					
Salt	40,000	40,000	40,000	40,000	40,000
CHRISTMAS ISLAND[2]					
Phosphate rock, marketable:					
Gross weight thousand tons	1,094	1,259	1,187	880	4 842
P_2O_5 content do	385	443	418	310	4 296
HONG KONG[2]					
Cement, hydraulic do	1,717	1,847	1,835	2,236	2,200
Clays:					
Kaolin	834	70	9,602	850	--
Other	51,272	92,293	82,446	68,737	4 94,504
Feldspar	5,275	23,101	26,777	35,208	4 22,853
Iron and steel: Metal: Steel, crude[e]	120,000	120,000	120,000	120,000	120,000
Quartz	--	34	116	33	--
NORTH KOREA[e 2]					
Aluminum metal ingot, primary	10,000	10,000	10,000	10,000	10,000
Cadmium metal, smelter	100	100	100	100	100
Cement, hydraulic thousand tons	8,000	8,000	8,000	8,000	9,000
Coal: Anthracite do	36,000	36,000	36,000	r70,000	70,000
Coke do	3,000	3,000	3,000	3,000	3,000
Copper:					
Mine output, Cu content	15,000	15,000	15,000	15,000	15,000
Metal:					
Smelter, primary and secondary	18,000	18,000	18,000	18,000	18,000
Refined, primary and secondary	22,000	22,000	22,000	22,000	22,000
Fluorspar	40,000	40,000	40,000	40,000	40,000
Gold, mine output, Au content troy ounces	160,000	160,000	160,000	160,000	160,000
Graphite	25,000	25,000	25,000	25,000	25,000
Iron and steel:					
Iron ore and concentrate, marketable:					
Gross weight thousand tons	8,000	8,000	8,000	r8,500	8,500
Fe content do	3,200	3,200	3,200	r3,400	3,400
Metal:					
Pig iron do	5,500	5,750	5,750	5,750	5,800
Ferroalloys, furnace type unspecified do	120	120	120	120	120
Steel, crude do	6,100	6,500	6,500	r4,500	4,500

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1983	1984	1985	1986[p]
NORTH KOREA[e 2] —Continued				
Lead:				
Mine output, Pb content	75,000	110,000	110,000	110,000
Metal, primary and secondary	60,000	95,000	95,000	95,000
Magnesite, crude thousand tons	1,900	1,900	1,900	1,900
Nitrogen: N content of ammonia do	450	450	450	450
Phosphate rock	500,000	500,000	500,000	500,000
Salt, all types	570,000	570,000	570,000	570,000
Silver, mine output, Ag content thousand troy ounces	1,600	1,600	1,600	1,600
Sulfur thousand tons	230	230	230	230
Talc, soapstone, pyrophyllite	170,000	170,000	170,000	170,000
Tungsten, mine output, W content	500	1,000	1,000	1,000
Zinc:				
Mine output, Zn content	140,000	140,000	180,000	180,000
Metal, primary	120,000	120,000	180,000	180,000
LAOS[e 2]				
Cement (from imported clinker)			[e]2,500	4,000
Gypsum[e]	70,000	[e]82,000	110,000	130,000
Salt, rock	10,000	[e]8,000	10,000	30,000
Tin, mine output, Sn content	359	430	[e]540	550
MONGOLIA[2]				
Cement, hydraulic thousand tons	165	141	151	[e]200
Coal:				
Anthracite and bituminous do	408	458	480	[e]500
Lignite and brown do	4,566	4,973	6,038	[e]6,200
Total do	4,974	5,431	6,518	[e]6,700
Copper, mine output, Cu content	104,000	[e]118,000	[e]128,000	[e]136,000
Fluorspar, all grades thousand tons	708	747	787	[e]790
Gypsum[e] do	32	32	32	32
Lime, hydrated and quicklime[e] do	93	95	95	95
Molybdenum, mine output, Mo content[e]	960	1,000	1,000	1,100
Petroleum refinery products:[e]				
Kerosene thousand 42-gallon barrels	23	23	23	23
Residual fuel oil do	20	20	20	20
Salt[e]	16,000	16,000	16,000	16,000
Tin, mine output, Sn content[e]	1,000	1,000	1,000	1,000
Tungsten, mine output, W content[e]	1,500	1,500	1,500	1,500
NEPAL[e]				
Cement, hydraulic	45,587	39,225	31,479	92,853
Clays for cement manufacture	[e]2,000	[e]2,000	4,242	6,798
Coal: Lignite	8,244	7,595	6,808	4,536
Copper ore:				
Gross weight	11	[e]9	6	[e]6
Cu content	4	[e]3	2	[e]2
Gem stones:				
Garnet kilograms	[e]23,000	[e]20,000	27,300	[e]25,000
Tourmaline do	[e]10	[e]12	60	[e]50
Lime, agricultural	[e]10,000	7,000	7,000	584
Magnesite, crude	15,016	14,603	19,851	63,190
Salt	6	700	7,500	[e]7,000
Stone:				
Limestone	50,422	[e]45,000	55,953	174,798
Marble:				
Chips	482	609	700	[e]700
Cut square meters	3,208	[e]3,000	7,641	10,442
Craggy do	3,530	708	691	3,580
Talc	15,263	7,595	6,015	[e]7,000
SINGAPORE[2]				
Cement, hydraulic thousand tons	3,153	2,821	1,992	1,805
Iron and steel: Metal: Steel, crude[e] do	350	350	350	350
Petroleum refinery products:				
Gasoline thousand 42-gallon barrels	19,738	17,731	[e]18,000	[e]18,000
Jet fuel do	30,690	43,578	[e]44,000	[e]44,000
Kerosene do	31,377	14,338	[e]14,000	[e]13,000
Distillate fuel oil do	88,258	76,677	[e]77,000	[e]75,000
Residual fuel oil do	81,906	87,418	[e]87,000	[e]85,000
Lubricants do	3,852	3,959	[e]4,000	[e]4,000
Other do	41,663	45,560	[e]46,000	[e]45,000
Refinery fuel and losses do	8,536	4,024	[e]4,000	[e]3,000
Total do	306,020	293,285	[e]294,000	[e]287,000

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1983	1984	1985	1986[p]	1987[e]
SINGAPORE[2] —Continued					
Stone: Granite, broken thousand cubic meters	7,569	7,422	6,743	5,565	[r]7,319
Sulfur, byproduct of petroleum	3,666	5,557	[e]6,000	[e]5,000	5,000
SRI LANKA					
Cement, hydraulic thousand tons	[r]506	500	600	600	600
Clays:					
Ball clay	11,980	16,500	23,825	20,470	[r]20,210
Kaolin	7,976	11,100	5,405	6,260	[r]6,869
Brick and tile clay[e]	60,000	70,000	70,000	[r]40,000	60,000
Clays for cement manufacture	51,931	[e]50,000	39,123	36,322	[r]23,277
Feldspar, crude and ground	2,609	5,200	9,789	7,270	[r]7,442
Gem stones, precious and semiprecious, other than diamond value, thousands	$39,814	$20,569	[e]$20,000	$23,304	[r]$13,196
Graphite, all grades	5,528	5,623	7,413	7,453	9,400
Iron and steel: Metal: Semimanufactures	24,546	15,990	9,310	10,872	[r]33,508
Mica, scrap[e]	[r]171	200	200	200	200
Nitrogen: N content of ammonia[e]	[r]62,700	70,000	30,000	--	--
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels	[r]806	1,100	1,100	1,100	1,100
Jet fuel do.	[r]517	700	700	700	700
Kerosene do.	[r]1,047	1,400	1,400	1,400	1,400
Distillate fuel oil do.	[r]3,703	5,000	5,000	5,000	5,000
Residual fuel oil do.	[r]3,235	4,350	4,350	4,500	4,500
Other do.	[r]1,252	1,650	1,650	1,500	1,500
Refinery fuel and losses[e] do.	600	800	800	800	800
Total do.	11,160	15,000	15,000	15,000	15,000
Phosphate rock	[e]16,000	13,685	[e]14,000	14,977	20,600
Rare-earth metals: Monazite concentrate, gross weight[e]	300	[r]147	200	200	200
Salt	129,222	107,000	76,858	104,278	[r]115,274
Stone:					
Limestone thousand tons	947	[e]1,000	[e]1,000	649	[r]2,044
Quartz, massive	764	1,100	1,566	1,090	[r]1,090
Titanium concentrate, gross weight:					
Ilmenite	81,778	102,048	114,854	129,907	[r]128,500
Rutile	8,093	6,467	8,558	8,443	[r]7,200
Zirconium: Zircon concentrate, gross weight	5,721	3,708	4,061	[e]4,000	4,000
VIETNAM[7]					
Bauxite: Gross weight[e]	3,000	5,000	6,000	6,000	6,000
Cement, hydraulic[e] thousand tons	[r]928	1,100	1,300	1,540	[r]1,512
Chromium: Chromite[e]	16,000	16,000	15,000	15,000	15,000
Clays: Kaolin[e]	1,200	1,000	1,000	1,000	1,000
Coal: Anthracite thousand tons	6,019	5,840	6,200	6,007	[r]6,500
Gypsum[e]	25,000	25,000	25,000	25,000	25,000
Iron and steel: Metal:[e]					
Steel, ingot thousand tons	100	100	110	110	110
Steel, rolled do.	40	40	50	50	50
Nitrogen: N content of ammonia	(8)	(8)	(8)	(8)	(8)
Petroleum: Crude[e] thousand 42-gallon barrels	--	--	--	200	600
Phosphate rock:[e]					
Gross weight thousand tons	200	200	[r]516	530	300
P_2O_5 content do.	66	66	170	175	105
Salt do.	890	[e]800	379	[e]450	229
Tin:[e]					
Mine output, Sn content	550	500	600	650	680
Metal, smelter	520	475	570	620	645
Zinc:[e]					
Mine output, Zn content	7,000	7,000	5,000	5,000	5,000
Metal, smelter, primary	6,000	6,000	4,200	4,200	4,200

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Aug. 24, 1988.

[2]In addition to the commodities listed, other crude construction materials such as sand and gravel and other varieties of stone presumably are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Data are for year ending June 30 of that stated.

[4]Reported figure.

[5]Gross production is not reported; the quantity vented, flared, or reinjected is believed to be negligible.

[6]Data are for the Nepalese fiscal year ending mid-July of that stated.

[7]In addition to the commodities listed, iron ore was mined in the past and pig iron was produced at industrial facilities, but the status of these industries under prevailing conditions is not sufficiently clear to allow formulation of reliable estimates of output levels. Similarly, data on output of crude construction materials and natural gas are not available, and no basis is available to make reliable estimates of output levels.

[8]Nitrogen (N content of ammonia) production capacity of the country's only known plant is 54,000 tons per year; it is not known at what output level the plant is operating.

BRUNEI[5]

Brunei's oil-rich history dates from the turn of this century. Bruneians had long been using oil seeps to obtain fuel for lamps, and in 1899, the first well was drilled near the capital in an area of oil seeps. The well was unsuccessful but a number of companies continued to explore for oil until 1918. By that time, only Anglo-Saxon Petroleum Co., a subsidiary of Royal Dutch Petroleum Co. of the Netherlands, remained. The present Royal Dutch subsidiary is incorporated in Brunei as Brunei Shell Petroleum Co. Ltd. Brunei Shell's continuing exploration work finally paid off with the discovery of the giant Seria Oilfield in 1929. Brunei became an oil exporter in 1932. Seria Oilfield production, which peaked at 115,000 barrels per day in 1956, passed the 1-billion-barrel mark in 1982. It continued to produce at yearend at 30,000 barrels per day.

The petroleum sector dominated the nation's economy, and the sector in turn was dominated by Brunei Shell, the only operating oil company in Brunei through 1986. Brunei Shell held the most extensive oil concessions but three other companies have exploration rights. These are Sunray Oil Co. (a subsidiary of Mobil Oil Corp. of the United States), Woods Petroleum Corp. of the United States, and Jasra Petroleum Sdn. Bhd. (Jaspet), of Brunei which formed a joint venture at yearend 1986 with Elf Aquitaine Offshore BV Asia, a subsidiary of Société Nationale Elf Aquitaine S.A. (Elf) of France.

Petroleum's contribution to the economy has declined somewhat in recent years because of the planned reduction in crude oil output and lower world oil and gas prices. In 1980, 83% of the gross domestic product (GDP) in 1980 prices was attributed to oil and gas. By 1985, the figure dropped to 65%, still dominating the economy.

The petroleum industry element of the GDP actually understates its domination in Brunei. The Government, the largest employer, relied almost entirely on petroleum income to pay its expenses. Much of the construction sector depended on contracts from Brunei Shell for petroleum-related work such as housing for petroleum workers and other infrastructure for producing, and transporting oil and gas. Many of the service sector merchants relied on oil operations for sales of tools, equipment, and parts.[6]

Electric power demand had been increasing steadily since 1974, when 211 million kilowatt-hours were supplied by an installed capacity of 81,000 kilowatts. By 1985, demand had risen to 906 million kilowatt-hours while the generating capacity was 268,000 kilowatts. Early in 1987, the Government inaugurated a cogeneration plant at Lumut with seven 21-megawatt gas turbine generators, each coupled to a waste-heat boiler for steam generation for the adjacent Brunei liquefied natural gas (LNG) plant. The $148 million powerplant[7] was a joint venture between the Government's Brunei Directorate of Electric Services and two of Brunei Shell's operating companies. The new plant is to supply the anticipated electricity needs of the country through the end of the century.

Petroleum production and trade have been intimately related in the Brunei economy because of the high percentage of production that is exported. Since 1981, 99% of Brunei's foreign-exchange earnings came from exports of oil and LNG. The value of petroleum exports has varied owing to world prices, mainly, and production levels. Exports of refined petroleum products reached a low in 1984 at $17 million and a peak of $275 million in 1980. The value of LNG varied from a low of $534 million in 1977 to a high of $1,618 million in 1981 while annual production remained nearly constant at 5 million tons during the past decade. The biggest earner every year has been crude oil. Sales of crude oil varied from a low of $1,156 million in 1976 to a high of $2,090 million in 1980. Since 1980, the value has declined steadily as a result of a Government-planned gradual reduction of output to conserve its petroleum.

Brunei Shell planned to drill two exploration wells during 1987 and Jaspet-Elf planned to begin drilling an offshore exploratory hole in November and another during 1988. An onshore well, started in 1986, was drilled near Jerudong and completed early in 1987. The well was believed to have produced a noncommercial amount of gas in a very complex geologic structure.

Seismic surveying continued both onshore and offshore. Onshore, 40 line-kilometers were completed in the Lahi and Jerudong areas. Offshore, 445 line-kilometers were surveyed west of the Cham-

pion Field, 71 line-kilometers in the Magpie Field, and 750 line-kilometers in the area between the Southwest Ampa and Magpie Fields.

Subject to Government of Brunei approval, a new company, Union Texas Brunei Ltd. was to have been formed in 1987 by Union Texas Petroleum Co. of Houston, Texas, to explore, reportedly, a 971-square-kilometer oil-and-gas concession. Union Texas was working with two partners, Woods Petroleum Corp. and OPUBCO International Ltd., the latter a subsidiary of Oklahoma Publishing Co. of Oklahoma City, Oklahoma.[8]

CAMBODIA[9]

The Cambodian mineral industry made no significant contribution to the economy of the country during 1987. Small amounts of brick, ceramics, lime, phosphate rock, and salt were produced for local consumption and in some cases provincewide consumption. A small cement grinding plant of a few tons per day capacity was believed to be in operation near Kampot using imported clinker. Colored gem stones had been mined in the Pailin area of Battambang Province, but because of unstable political conditions in the area, officials had discouraged the mining for the last few years.

There were no known mineral exports during the year. The major mineral import was a modest amount of petroleum products. Cement clinker, fertilizer materials, and steel semimanufactures were generally imported in amounts totalling a few hundred tons per year.

The second conference on geological cooperation was held during March by representatives from Cambodia, Laos, and Vietnam. One result of the conference was an agreement by the countries to coordinate in making a geological map on a scale of 1:1,000,000 by the end of the year. In addition, they will continue a survey of mineral deposits at the frontier areas of the three countries, to be finished in 1989.

The industrial sector, never a major part of the Cambodian economy, was destroyed during the 1970's. With major assistance from the U.S.S.R. and Vietnam, about 60 establishments were restored.[10] Only a few of these were related to minerals. One was a reinforced-concrete-products plant with a capacity of 2,000 cubic meters per year. The Soviet Union assisted with the reconstruction of the plant, which will make slabs, panels, and beams for the country's rudimentary construction industry.

Another plant reportedly restored during the year was a small phosphate fertilizer factory at Touk Meas in Kampot Province. The plant was a grinding and roasting facility for locally dug phosphate rock. The treatment increased the solubility of the phosphate, thereby increasing its effectiveness on annual crops, but it did not require the high technology and large capital investment of a superphosphate plant.

The only known production of metal during the year was the recovery of scrap from the many damaged weapons and war materiel left from the years of military conflict. A small crude smelter melted aluminum, brass, and possibly steel scrap to cast into pots and utensils for domestic use.

Under an agreement signed in May, Vietnamese officials agreed to help Cambodia in the transportation of fuel, to expand a 6,500-cubic-meter fuel-storage facility near Phnom Penh, and to build a small "oil refinery."[11] Considering that Cambodia has no domestic crude oil production, and that Vietnam itself has no oil refineries as yet, the intent of the aid agreement probably was to set up a small used-motor-oil recovery and cleaning plant for the recycling of expensive vehicle lubricants.

CHRISTMAS ISLAND[12]

Since 1987, Guano-based phosphate rock has been the mainstay of the economy of the Territory of Christmas Island, an island south of Java, Indonesia, in the Indian Ocean. The island has been a territory of Australia since October 1, 1958. The phosphate operations were owned and operated by Phosphate Mining Co. of Christmas Island, a wholly Australian Government-owned firm headquartered in Perth.

Although the Christmas Island deposit has traditionally been one of two principal sources of phosphate rock for Australia, the Australian Government suspended operations at the mine in November following intense industrial disputes, low productivity levels, and continued deteriorating profitability during the year. In addition to closure, the Government announced that the mine's infrastructure would be demolished.

The Government also cited the steady exhaustion of high-grade phosphate reserves and the drain on the Australian treasury of the islanders themselves as reasons for closing the mine. The Government had been subsidizing housing rents, as well as electricity and water for the mine.

Near yearend, the Union of Christmas Island Workers commissioned a consulting firm to assess the feasibility of reopening the mine through private operation. However, the Government had already announced that no further erosion of the island's rain forest region, where most of the remaining high-grade reserves were located, would be permitted.

Table 2.—Christmas Island: Exports of phosphate rock, by destination

(Thousand metric tons)

Destination	1985	1986	1987
Australia	499.0	489.9	358.8
Indonesia	37.9	18.2	39.7
Japan	39.4	41.3	15.0
Korea, Republic of	44.7	22.8	9.3
Malaysia	230.9	196.2	253.8
New Zealand	326.9	107.1	164.9
Philippines	2.0	--	--
Sri Lanka	--	1.1	--
Taiwan	6.2	3.7	5.4
Other	--	.3	--
Total	1,187.1	880.1	846.9

Source: Phosphate Rock Statistics 1987, International Fertilizer Industry Association Ltd.

HONG KONG[13]

At the end of 1987, there was only one mining lease, one mining license, and one prospecting license registered with the Mines Division of Hong Kong's Labour Department. The only extant mining operations were those for the extraction of small amounts of clays and feldspar. The Mines Division also controls the possession, conveyance, storage, manufacture and use of explosives in Hong Kong. During the year, 4,773 tons of explosives was consumed in blasting for civil construction projects. In addition, transit storage was provided for explosives imported from the United States and France for use by companies conducting offshore oil drilling in the South China Sea.

Hong Kong's economy is virtually trade-oriented, importing raw materials for processing into finished products for export. The domestic industry is based on light manufacturing. Textiles and clothing constitute the largest industry, accounting for 41% of the value of domestic exports and 43% of the industrial work force. Electronics is the second-largest export earner followed by watches and clocks, which displaced toys as the third-largest export-earner.

The value of total imports in 1987 was $50.7 billion; total exports were valued at $48.7 billion.[14] Hong Kong was the 10th-largest trading partner of the United States in 1987. Exports to the United States were valued at $13.5 billion while U.S. exports to Hong Kong totaled $4.1 billion. About 25% of the value of Hong Kong's total trade is made up of goods shipped to and received from China.

Table 3.—Hong Kong: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	16,566	19,987	--	Taiwan 15,277; Indonesia 2,416; Republic of Korea 2,294.
Oxides and hydroxides	64,161	681	--	China 632; Philippines 29.
Metal including alloys:				
Scrap	18,423	22,080	--	Japan 20,695; China 622.
Unwrought	48,903	26,085	--	Thailand 3,535; China 5,173; Taiwan 4,648.
Semimanufactures	46,145	29,531	3,007	China 16,728; Taiwan 2,892.
Arsenic: Oxides and acids	81	308	39	China 216; Indonesia 45.
Chromium: Oxides and hydroxides	76	387	--	West Germany 90; Republic of Korea 82; North Korea 42.
Cobalt: Oxides and hydroxides	29	31	--	Vietnam 10; Taiwan 6; Republic of Korea 6.

See footnotes at end of table.

Table 3.—Hong Kong: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS —Continued				
Copper:				
Oxides and hydroxides	37	150	--	China 144.
Sulfate	51	72	--	Burma 25; Indonesia 21; China 15.
Metal including alloys:				
Scrap	24,444	27,947	--	Japan 11,902; Taiwan 7,083; Republic of Korea 3,308.
Unwrought	4,001	1,630	(2)	China 670; Republic of Korea 432; Taiwan 413.
Semimanufactures	5,594	9,576	125	China 5,843; Taiwan 1,589; Singapore 737.
Gold:				
Waste and sweepings:				
value, thousands	$3,665	$23,919	$491	Switzerland $11,440; West Germany $6,464; United Kingdom $3,952.
Metal including alloys, unwrought and partly wrought:				
thousand troy ounces	68	1,542	75	United Kingdom 1,039; Switzerland 161; West Germany 139.
Iron and steel: Metal:				
Scrap	319,137	275,389	322	Taiwan 149,779; Indonesia 69,276; Japan 40,505.
Pig iron, cast iron, related materials	2,156	133	--	Fiji 62; China 53; Philippines 18.
Ferroalloys:				
Ferromanganese	500	496	--	North Korea 495.
Ferrosilicon	--	3,483	--	Republic of Korea 1,626; Taiwan 1,197; Indonesia 292.
Unspecified	563	1,662	--	North Korea 822; Netherlands 601; Republic of Korea 140.
Steel, primary forms	41,920	24,842	--	China 19,839; Taiwan 4,971.
Semimanufactures:				
Bars, rods, angles, shapes, sections	834,999	456,109	3	China 421,807; Macau 18,014; Singapore 7,277.
Universals, plates, sheets	71,177	187,525	--	China 172,600; Macau 4,037; Taiwan 3,562.
Hoop and strip	5,712	14,260	--	China 11,188; Taiwan 1,738; Philippines 358.
Rails and accessories	45	231	--	Singapore 117; China 114.
Wire	9,352	13,732	9	China 12,075; Macau 679.
Tubes, pipes, fittings	41,938	42,906	64	China 39,254; Macau 2,065.
Castings and forgings, rough	9	11	--	All to Taiwan.
Lead:				
Oxides	33	54	--	Indonesia 30; Pakistan 12; North Korea 10.
Metal including alloys:				
Scrap	1,883	2,502	--	Taiwan 1,366; China 1,101.
Unwrought	345	435	--	China 378; Vietnam 50.
Semimanufactures	56	269	--	Philippines 204; China 42.
Magnesium: Metal including alloys, all forms	44	418	--	China 366.
Manganese:				
Ore and concentrate	120	200	--	Indonesia 113; Republic of Korea 60.
Oxides	618	1,213	2	Indonesia 434; Republic of Korea 249; Vietnam 144.
Mercury 76-pound flasks	1,237	2,719	1,190	Indonesia 825; Australia 454.
Nickel:				
Oxides and hydroxides	244	162	--	Taiwan 147; Republic of Korea 7.
Metal including alloys:				
Scrap	118	387	--	Japan 358.
Unwrought	3,242	4,865	--	Taiwan 3,131; North Korea 637; Republic of Korea 481.
Semimanufactures	1,081	376	--	Taiwan 171; Republic of Korea 121; China 47.
Platinum-group metals:				
Waste and sweepings:				
value, thousands	$451	$4,168	$1,935	United Kingdom $1,051; West Germany $591.
Metals including alloys, unwrought and partly wrought:				
troy ounces	26,645	19,905	2,577	United Kingdom 7,249; Japan 3,595; China 2,837.
Silver:				
Waste and sweepings:				
value, thousands	$71,890	$22,641	--	France $11,133; United Kingdom $8,473; West Germany $3,024.
Metal including alloys, unwrought and partly wrought:				
thousand troy ounces	611	1,284	--	Japan 586; Thailand 270; China 183.

See footnotes at end of table.

Table 3.—Hong Kong: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	4,768	3,709	191	Singapore 864; Malaysia 647; Rep lic of Korea 602.
Metal including alloys:				
Scrap	90	24	13	United Kingdom 10.
Unwrought	5,570	1,943	271	Japan 827; Taiwan 349.
Semimanufactures	648	747	...	Taiwan 303; China 167; Singapore 134.
Titanium: Oxides	2,743	2,840	136	China 829; India 662; Vietnam 24
Tungsten:				
Ore and concentrate	1,717	2,013	...	U.S.S.R. 1,415; North Korea 403; Netherlands 145.
Metal including alloys, all forms	2	5	...	Netherlands 3; China 2.
Uranium and/or thorium: Oxides and other compounds kilograms	4,340	8,081	...	Republic of Korea 6,000; China 2,0
Zinc:				
Oxides	393	835	...	Vietnam 528; Indonesia 191; Chin 39.
Blue powder	172	51	...	All to China.
Metal including alloys:				
Scrap	78	33	...	Do.
Unwrought	4,496	31,245	3,147	Republic of Korea 9,850; China 8,0 Macau 3,555.
Semimanufactures	86	223	...	China 179; Indonesia 39.
Other:				
Ores and concentrates	8,270	9,389	927	Republic of Korea 4,376; China 1,8 Taiwan 1,279.
Ashes and residues	10	473	...	Taiwan 216; China 166; India 46.
Base metals including alloys, all forms	6,537	5,495	605	Netherlands 2,044; China 809; Jap 440.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,409	2,773	...	Indonesia 700; China 667; Macau 4
Artificial:				
Corundum	9,011	18,117	734	Taiwan 7,547; Republic of Korea 6,621; Japan 2,258.
Silicon carbide	1,210	1,919	55	Taiwan 701; Republic of Korea 600 Japan 439.
Dust and powder of precious and semi-precious stones including diamond value, thousands	$87	$592	...	Belgium-Luxembourg $400; China $186.
Grinding and polishing wheels and stones	3,099	3,213	144	Indonesia 2,112; China 312.
Asbestos, crude	155	21	...	Republic of Korea 16; Indonesia 5.
Barite and witherite	16	120	...	All to Republic of Korea.
Boron materials: Oxides and acids	306	312	...	Republic of South Africa 145; Repu lic of Korea 85; North Korea 79.
Bromine and fluorine		22	...	All to North Korea.
Cement	738,876	901,687	...	China 534,143; Macau 364,716.
Clays, crude	97,898	120,431	...	Taiwan 94,855; Republic of Korea 18,696; Indonesia 2,338.
Diamond:				
Gem, not set or strung carats	540,141	500,091	132,133	Belgium-Luxembourg 147,188; Isra 77,139.
Industrial stones do	157,507	357,939	...	China 128 562; Netherlands 110,12
Diatomite and other infusorial earth	254	442	...	China 417; India 15.
Feldspar, fluorspar, related materials	38,571	50,555	...	Taiwan 41,985; Indonesia 7,180; Re public of Korea 890.
Fertilizer materials:				
Crude, n.e.s	393	800	...	China 642; United Arab Emirates 158.
Manufactured:				
Ammonia	12	47	...	All to China.
Nitrogenous	51,079	2,448	...	China 2,354.
Potassic	1,901			
Unspecified and mixed	1,574	6,488	6	China 5,490; Malaysia 830.
Graphite, natural	508	3,036	...	Republic of Korea 2,508; France 200 Taiwan 191.
Gypsum and plaster	7,307	4,709	1	Macau 3,510; Indonesia 565; China 430.
Iodine	910	2	...	Mainly to North Korea.
Lime	114	47	...	All to China.

See footnotes at end of table.

Table 3.—Hong Kong: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds:				
Magnesite, crude	15,444	28,167	--	Taiwan 20,740; Indonesia 6,368; Republic of Korea 1,001.
Oxides and hydroxides	12	1,311	--	Taiwan 815; Republic of Korea 438; China 32.
Meerschaum, amber, jet kilogram	57	--		
Mica:				
Crude including splittings and waste	8	6	--	Taiwan 3; Republic of South Africa 2.
Worked including agglomerated splittings	83	83	--	China 69; Republic of South Africa 4.
Pigments, mineral:				
Natural, crude	517	970	--	Indonesia 788; Taiwan 57; Japan 52.
Iron oxides and hydroxides, processed	2,138	3,037	--	Indonesia 1,154; China 663; United Kingdom 363.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$78,806	$106,213	$25,364	Japan $44,114; China $11,198.
Synthetic do	$659	$705	$216	China $120; France $108.
Salt and brine	1,039	947	--	China 666; Papua New Guinea 84; Thailand 82.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	585,296	378,118	--	China 377,713.
Sulfate, natural and manufactured	5,366	12,729	--	Indonesia 7,457; Vietnam 3,124; Republic of Korea 871.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	4,413	6,380	35	Taiwan 4,324; Indonesia 451.
Worked	11,366	10,989	185	China 9,507; Macau 545; Malaysia 314.
Dolomite, chiefly refractory-grade	36	36	--	All to China.
Gravel and crushed rock	4,842	1,413	--	China 916; Taiwan 374.
Limestone other than dimension	19,284	1,261	--	All to China.
Quartz and quartzite	1,491	1,183	--	Taiwan 540; Sudan 230; Bangladesh 120.
Sand other than metal-bearing	1,833	639	--	Macau 337; China 233.
Sulfur:				
Elemental:				
Crude including native and byproduct	31	5,066	--	Indonesia 5,054.
Colloidal, precipitated, sublimed	25	96	--	Indonesia 50; Vietnam 20; Philippines 17.
Sulfuric acid	228	64	--	China 56; Vietnam 5.
Talc, steatite, soapstone, pyrophyllite	13,471	29,250	--	Indonesia 20,548; Taiwan 4,406; Republic of Korea 2,998.
Other:				
Crude	1,015	1,441	42	Taiwan 1,095; China 289.
Slag and dross, not metal-bearing	5,957	359	--	Republic of Korea 200; China 62; Taiwan 60.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	18	21	--	All to China.
Carbon black	8,586	3,446	--	China 2,073; North Korea 633; Indonesia 427.
Coal: Anthracite	5	10	--	All to Brunei.
Coke and semicoke	337	500	--	Indonesia 488.
Petroleum refinery products thousand 42-gallon barrels	1,854	6,101	(2)	China 4,394; Macau 1,294.

[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 4.—Hong Kong: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	18,773	20,526	20	China 20,481.
Oxides and hydroxides	32,818	57	--	Japan 35; Belgium-Luxembourg 7; China 4.
Metal including alloys:				
Scrap	888	1,301	65	Macau 664; China 229.
Unwrought	76,071	46,950	591	Canada 18,791; Australia 7,724; North Korea 6,675.
Semimanufactures	74,422	58,870	879	Taiwan 16,810; Japan 7,796; Republic of Korea 7,143.
Arsenic: Oxides and acids	99	116	--	All from China.
Chromium: Oxides and hydroxides	513	747	23	China 381; West Germany 278.
Cobalt: Oxides and hydroxides	19	48	--	United Kingdom 25; China 12; West Germany 10.
Copper:				
Oxides and hydroxides	156	288	18	West Germany 169; Norway 95.
Sulfate	271	373	6	France 115; China 83; Thailand 56.
Metal including alloys:				
Scrap	9,148	6,784	2,299	China 1,998; Vietnam 1,175; Singapore 741.
Unwrought	5,391	2,357	726	Republic of South Africa 428; North Korea 226.
Semimanufactures	54,191	70,247	3,551	Japan 27,122; Taiwan 9,937; China 9,444.
Gold:				
Waste and sweepings value, thousands	$383	$587	$1	Malaysia $529; China $31.
Metal including alloys, unwrought and partly wrought thousand troy ounces	5,229	1,648	2	Switzerland 998; China 324; Australia 152.
Iron and steel: Metal:				
Scrap	20,093	33,669	10,919	Canada 7,826; Macau 6,752; China 3,170.
Pig iron, cast iron, related materials	4,891	4,316	21	North Korea 3,558; France 286.
Ferroalloys:				
Ferromanganese	1,848	1,938	--	Republic of South Africa 1,005; Netherlands 506; Norway 185.
Ferrosilicon	1,690	4,677	--	China 3,833; Republic of South Africa 610.
Unspecified	1,547	3,220	--	Republic of South Africa 1,542; China 933; Australia 655.
Steel, primary forms	147,722	173,778	--	Republic of South Africa 100,624; Spain 29,831; West Germany 14,781.
Semimanufactures thousand tons	2,300	2,444	44	Japan 749; Republic of South Africa 415; China 205.
Lead:				
Oxides	143	168	(2)	China 90; West Germany 41; Belgium-Luxembourg 11.
Metal including alloys:				
Scrap	458	681	--	China 164; Australia 157; Singapore 118.
Unwrought	2,321	5,071	--	U.S.S.R. 2,499; Taiwan 1,238; China 693.
Semimanufactures	244	213	1	Republic of South Africa 79; China 45; United Kingdom 33.
Magnesium: Metal including alloys, all forms	44	396	268	Norway 69; Japan 50.
Manganese:				
Ore and concentrate	243	341	--	All from China.
Oxides	885	1,455	--	China 1,196; Japan 250.
Mercury 76-pound flasks	2,834	3,586	--	China 3,425; Spain 87.
Molybdenum: Metal including alloys, all forms kilograms	108	126	--	All from Austria.
Nickel:				
Oxides and hydroxides	273	199	--	Canada 164; China 18.
Metal including alloys:				
Unwrought	3,812	7,053	55	Canada 3,361; Norway 1,777; Finland 510.
Semimanufactures	1,460	327	65	Canada 128; Japan 42.

See footnotes at end of table.

Table 4.—Hong Kong: Imports of mineral commodities —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
METALS —Continued				
Platinum-group metals:				
Waste and sweepings:				
value, thousands	--	$8	--	All from Taiwan.
Metals including alloys, unwrought and partly wrought:				
troy ounces	43,964	18,895	19	United Kingdom 12,499; Australia 2,860; Switzerland 1,789.
Silver:				
Waste and sweepings:				
value, thousands	$112	$39	--	All from Philippines.
Metal including alloys, unwrought and partly wrought:				
thousand troy ounces	1,390	1,904	33	Australia 690; Japan 568; United Kingdom 200.
Tin:				
Ore and concentrate	6,100	1,755	--	All from China.
Metal including alloys:				
Scrap	61	35	--	Malaysia 29; China 5.
Unwrought	3,982	3,568	24	China 2,613; Singapore 374; Malaysia 320.
Semimanufactures	882	634	16	China 323; Singapore 127; Japan 77.
Titanium: Oxides	7,492	8,283	861	China 2,009 Australia 1,574; United Kingdom 1,487.
Tungsten:				
Ore and concentrate	3,799	3,626	--	China 3,457.
Metal including alloys, all forms	--	1	--	All from China.
Uranium and/or thorium: Oxides and other compounds	27	22	2	France 16; Japan 2.
Zinc:				
Oxides	699	1,171	20	China 786; France 144; Canada 90.
Blue powder	84	17	--	West Germany 6; United Kingdom 5; Singapore 2.
Metal including alloys:				
Scrap	178	539	33	Macau 449; China 57.
Unwrought	32,713	70,262	32	China 34,987; Australia 15,698; Belgium-Luxembourg 6,693.
Semimanufactures	575	710	5	West Germany 214; Belgium-Luxembourg 142; Republic of Korea 72.
Other:				
Ores and concentrates	8,830	8,301	--	China 8,196.
Oxides and hydroxides	2,950	2,594	(2)	China 2,511.
Ashes and residues	4,710	5,914	--	China 5,878.
Base metals including alloys, all forms	5,705	7,026	268	China 5,656; Singapore 248; Philippines 239.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	10,321	27,672	374	Indonesia 13,747; Japan 6,586; China 6,240.
Artificial:				
Corundum	10,777	18,710	91	China 18,019; Japan 419.
Silicon carbide	1,279	1,765	(2)	China 1,713; Taiwan 24.
Dust and powder of precious and semi-precious stones including diamond:				
value, thousands	$28	$97	$17	Ireland $27; Belgium-Luxembourg $22.
Grinding and polishing wheels and stones	4,796	4,062	62	China 2,558; Japan 803; Taiwan 380.
Asbestos, crude	168	82	--	All from China.
Barite and witherite	227	425	--	China 274; Thailand 126.
Boron materials: Oxides and acids	544	559	245	China 230; U.S.S.R. 84.
Bromine and fluorine	58	44	--	Mainly from Italy.
Cement thousand tons	3,460	4,131	--	Japan 1,918; Taiwan 1,109; Republic of Korea 740.
Chalk	8			
Clays, crude	113,092	144,294	1,217	China 116,961; Macau 19,380.
Cryolite and chiolite	4	5	--	All from Denmark.
Diamond:				
Gem, not set or strung: thousand carats	1,434	2,091	105	India 912; Israel 504; Belgium-Luxembourg 311.
Industrial stones do	234	427	17	Netherlands 267; China 73; Ireland 46.
Diatomite and other infusorial earth	602	984	984	

See footnotes at end of table.

Table 4.—Hong Kong: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials	23,989	37,396	--	All from China.
Fertilizer materials:				
Crude, n.e.s	715	812	--	Canada 314; Netherlands 304; China 106.
Manufactured:				
Ammonia	1,611	2,045	--	China 1,863; Netherlands 88; United Kingdom 41.
Nitrogenous	66,515	6,735	2	China 2,173; Japan 1,803; Republic of Korea 960.
Potassic	15,000	--	--	--
Unspecified and mixed	9,509	14,265	77	Belgium-Luxembourg 5,269; West Germany 4,378; Republic of Korea 3,430.
Graphite, natural	1,499	3,685	--	All from China.
Gypsum and plaster	103,210	110,865	168	Thailand 69,377; Japan 26,629.
Iodine kilograms	550	1,500	1,000	West Germany 250; Japan 250.
Lime	42,715	44,588	--	China 43,825; Japan 718.
Magnesium compounds:				
Magnesite, crude	19,798	29,791	--	China 29,334.
Oxides and hydroxides	1,533	1,710	--	Japan 1,310; China 338.
Meerschaum, amber, jet kilograms	600	--	--	--
Mica:				
Crude including splittings and waste	32	48	--	United Kingdom 43; India 5.
Worked including agglomerated splittings	819	1,022	13	Japan 382; Belgium-Luxembourg 343; France 221.
Pigments, mineral:				
Natural, crude	461	940	--	China 932.
Iron oxides and hydroxides, processed	3,618	5,288	1,065	China 2,406; Japan 809.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$61,378	$77,271	$12,775	Thailand $21,093; India $6,159; China $4,142.
Synthetic do	$2,014	$2,699	$665	Japan $375; Thailand $342.
Salt and brine	106,599	130,537	6	China 119,012; West Germany 4,803.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	564,463	414,020	371,394	East Germany 17,751; Poland 8,451.
Sulfate, natural and manufactured	29,140	45,878	6	China 44,388; Taiwan 1,386.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	6,433	13,644	--	China 13,002.
Worked	27,439	35,084	12	Italy 24,657; China 3,091; Spain 2,535.
Dolomite, chiefly refractory-grade	356	201	--	United Kingdom 165; Norway 36.
Gravel and crushed rock thousand tons	3,401	4,849	(2)	China 4,590; Macau 251.
Limestone other than dimension	26,042	38,448	--	China 38,124.
Quartz and quartzite	2,924	8,243	--	China 8,088.
Sand other than metal-bearing thousand tons	1,108	1,273	(2)	China 1,271.
Sulfur:				
Elemental:				
Crude including native and by-product	530	5,342	10	China 5,242.
Colloidal, precipitated, sublimed	58	294	--	West Germany 255; Netherlands 20; Taiwan 18.
Dioxide	200	19	19	--
Sulfuric acid	5,858	6,613	59	China 6,473; United Kingdom 40.
Talc, steatite, soapstone, pyrophyllite	15,972	32,707	172	China 32,172.
Other:				
Crude	3,043	6,997	607	China 6,114.
Slag and dross, not metal-bearing	649	1,116	--	China 921; Thailand 169.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	108	59	17	Spain 36; Singapore 6.
Carbon black	9,181	3,281	120	Republic of Korea 2,075; China 643.
Coal: Anthracite and bituminous thousand tons	5,523	6,393	(2)	Republic of South Africa 2,524; Australia 2,417; China 1,078.

See footnotes at end of table.

Table 4.—Hong Kong: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	4,288	3,860		China 2,671; Japan 638; Taiwan 551.
Petroleum refinery products thousand 42-gallon barrels	37,724	47,594	1,734	Singapore 33,423; China 8,380.

[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

NORTH KOREA[15]

The Government began its ambitious third 7-year plan (1987-93). The plan called for an annual growth of 8% in gross national product (GNP). Judging from the 3% GNP growth in 1985 and 1986, it was highly unlikely that the goal was achieved in 1987 because industrial production, for example, would have had to increase much more than available capacity. In general, the country's plants, machinery, and infrastructure were old and inefficient. It was relying on massive aid from China and the U.S.S.R. for technology and capital to fulfill the plan's output targets. North Korea has had a trade deficit for several years, accumulating a foreign debt of more than $3 billion.[16] In August, European creditor banks threatened to freeze the country's bank assets in London, including gold bullion, if North Korea refused to service bank loans of $850 million plus interest, unpaid since 1984. Major imports were flour, machinery, crude oil, and wheat while principal exports consisted of minerals, metals, and rice. During the third 7-year plan, massive exports were targeted for cement; magnesia clinker; nonferrous metals, mainly lead and zinc; and rolled steel. The country had a trade agreement with India, exchanging its zinc for India's wheat. Proposals of broader trade were being negotiated for supplying steel plate, sulfur, and urea to India in return for agrochemicals, mica, and mining machinery. North Korea imported steam coal from China and the U.S.S.R. and coking coal from Australia. It exported barite to the U.S.S.R. and magnesia to the European Economic Community. The steel production target was 10 million tons in 1987 compared with 9 million tons in 1986, despite the fact that the country's annual capacity was only 7.5 million tons. Expansion of the Kim Chaek iron and steel complex, the country's largest integrated steel plant, increase steel production by 480,000 tons. During the third plan, the output capacity was to be further expanded from 2 million to 4 million tons. Plant expansion and process innovation at the Hwanghae iron and steel complex boosted steel production by 70,000 tons. The capacity of the Kangson steel plant was doubled to 1.4 million tons per year. The Nampo steel plant is to be expanded from 1 million to 3 million tons per year. Iron ore production in 1987 was 8.5 million tons from reserves estimated to be 3.3 billion tons. To meet increased steel production, new iron ore mines were opened at Tokonsong and Sohaeri. Mechanization and commissioning of a powerplant at the Musan Mine, North Korea's largest iron ore mine, helped to increase production by 614,000 tons. Its capacity was expanded from 5.5 million to 6.5 million tons per year. During the third 7-year plan, production of nonferrous metals, notably copper, lead, and zinc, was to be more than 1.7 million tons of metal per year from mines and plants in the Komdok, Tanchon, and Yanggang Districts. However, production of metals in terms of gross weight of ore for 1987 from these districts was only 700,000 tons. North Korea's lead and zinc ore reserves are estimated at 6 million and 12 million tons, respectively. The production of lead and zinc contained in ore was 110,000 tons and 225,000 tons, respectively. At the Komdok mining complex, the dressing capacity of lead and zinc ore was rated at 10 million tons per year. The country's copper ore reserves are estimated to be 2.2 million tons. However, most of the feed for the country's copper smelter came from imports of Peruvian copper concentrates. The out-

put of aluminum was also to increase in the 7-year plan due to the planned installation of a new aluminum smelter. The Government and North Korean business executives in Tokyo planned to reopen the Unsan gold mine, 100 kilometers north of Pyongyang, which originally began production in 1896. Production was expected to be 32,000 troy ounces of gold per year by yearend 1988 and 321,000 ounces within a decade from an investment of $55 million. North Korea intended to repay the Japanese creditors with gold.

In the industrial mineral sector, North Korea was the largest producer of magnesite in the world. Kanjo Province has large deposits of high-grade magnesite and an annual production of 1.5 million tons. The processing plant at the Tanchon magnesia complex was expanded and the first-stage construction was completed in 1987. Construction of the Sariwon potassic fertilizer complex with innovative technology was under way. The ore feed for the complex will come from a potassic feldspar mine being developed in the Chongdan District. Annual cement capacity was 12 million tons in 1987, and the target in the third 7-year plan was to increase output to 22 million tons per year by 1993. Most of the increase in capacity was to come from new installations at Sariwon and Kaechon. Cement output was 9 million tons in 1987. The Sunchon cement complex, with a capacity of 3 million tons per year, was to be modernized and expanded in 1988. The country's only indigenous energy sources were coal and hydropower. Coal reserves are estimated to be 11.9 billion tons. Coal production in North Korea increased to 70 million tons in 1986 and 1987. Production was expected to rise to 120 million tons per year by 1993. The Kukdong and Yangjong coal mines produced more than 1 million tons of metallurgical coal. Five of 10 planned new pits at Anju in western North Korea, 60 kilometers north of Pyongyang, completed development in 1987. Construction of the Sosa and Soho surface mines at Arju was also completed. In the Districts of Sunchon, Takchon, Pukchang, and Kangdong, other pits were to be modernized and expanded to increase coal production. A new 750,000-kilowatt power station at Taichuan was under construction on the Datong River. Ten other hydropower dams were built previously on this river.

Table 5.—North Korea: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal destinations, 1986
METALS			
Aluminum: Metal including alloys, all forms	8,715	11,474	Hong Kong 6,675; Japan 3,632.
Copper: Metal including alloys, all forms	[2]1,107	940	Japan 611; Hong Kong 226.
Gold: Metal including alloys, unwrought and partly wrought, troy ounces	133,715	NA	
Iron and steel: Metal:			
Scrap	2,520	25,160	All to Japan.
Pig iron, cast iron, related materials	74,127	73,206	Japan 69,648; Hong Kong 3,558.
Ferroalloys	3,765	4,298	U.S.S.R. 3,040; Japan 1,258.
Steel, primary forms	115,865	107,873	Japan 61,868; Thailand 26,178.
Semimanufactures:			
Bars, rods, angles, shapes, sections	10,645	68	Singapore 44; France 24.
Universals, plates, sheets	33,127	39,286	Japan 18,322; Hong Kong 16,110.
Hoop and strip	--	62	All to Singapore.
Rails and accessories	16	--	
Tubes, pipes, fittings	515	163	France 107; Singapore 51.
Castings and forgings, rough	2	--	
Lead: Metal including alloys, all forms	8,769	15,325	Japan 7,890; West Germany 6,833.
Magnesium: Metal including alloys, all forms	--	20	All to Japan.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, value, thousands	--	$1,828	All to West Germany.
Silver: Metal including alloys, unwrought and partly wrought, do.	$96	$8,664	West Germany $8,607; Thailand $57.
Zinc:			
Ore and concentrate	11,843	11,033	All to Japan.
Oxides	10	--	
Metal including alloys, all forms	33,631	41,643	Japan 39,054; Hong Kong 2,457.
Other:			
Ores and concentrates	--	10	All to Japan.
Ashes and residues	[3]	3,331	Japan 3,311.
Base metals including alloys, all forms	29	15	All to Singapore.

See footnotes at end of table.

Table 5.—North Korea: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal destinations, 1986
INDUSTRIAL MINERALS			
Cement	263,000	20	All to Barbados.
Clays, crude	10,579	9,122	All to Japan.
Feldspar		880	Do.
Fertilizer materials: Manufactured:			
Nitrogenous	3,096		
Potassic	15,000		
Unspecified and mixed	13,937		
Graphite, natural	5,798	4,560	Japan 4,306; Poland 195.
Magnesium compounds, unspecified	[4]168,935	194,163	Poland 92,652; West Germany 42,820; Japan 33,007.
Precious and semiprecious stones other than diamond: Natural and synthetic: value, thousands	$11	$101	Italy $91; Hong Kong $8.
Stone, sand and gravel:			
Dimension stone, all forms	6,662	8,457	All to Japan.
Gravel and crushed rock	299	494	Do.
Quartz and quartzite	[5]		
Talc, steatite, soapstone, pyrophyllite	20,430	23,800	Japan 14,383; Poland 9,417.
Other: Crude	[6]	701	All to Japan.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	100	165	All to Thailand.
Coal, all grades including briquets	259,138	405,609	All to Japan.
Petroleum refinery products:			
Kerosene and jet fuel 42-gallon barrels		442	All to Hungary.
Residual fuel oil do	94,938		

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any imports of mineral commodities from North Korea during 1986.

[2]Excludes unreported quantity valued at $942,000 imported by Japan.

[3]Unreported quantity valued at $397,000 imported by Japan.

[4]Excludes unreported quantity valued at $6,770,000 imported by Japan.

[5]Unreported quantity valued at $148,000 imported by Japan.

[6]Unreported quantity valued at $45,000 imported by Japan.

Table 6.—North Korea: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal sources, 1986
METALS			
Alkali and alkaline-earth metals	[2]1	[3]	All from Japan.
Aluminum:			
Oxides and hydroxides	28,208	11,539	Japan 11,521.
Metal including alloys:			
Unwrought	6,473		
Semimanufactures	1,315		
Chromium:			
Ore and concentrate	16,000	25,000	All from U.S.S.R.
Oxides and hydroxides	66	64	Hong Kong 42; Japan 22.
Cobalt: Oxides and hydroxides	2	3	Mainly from Hong Kong.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	4,000	386	All from Japan.
Copper:			
Ore and concentrate	4,443	1,149	Do.
Metal including alloys:			
Scrap	18	798	Do.
Unwrought	1,198	500	Chile 498.
Semimanufactures	226	84	Japan 63; Hong Kong 13.
Gold:			
Contained in copper ore and concentrate: value, thousands	$239		
Metal including alloys, unwrought and partly wrought do		$7	All from Japan.

See footnotes at end of table.

Table 6.—North Korea: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal sources, 1986
METALS —Continued			
Iron and steel: Metal:			
Ferroalloys:			
Ferromanganese	7,506	843	Hong Kong 495; Japan 348.
Unspecified	681	1,922	Hong Kong 822; Japan 586; Fr 504.
Semimanufactures:			
Bars, rods, angles, shapes, sections	513	478	Japan 278; Sweden 144.
Universals, plates, sheets	5,076	3,486	Japan 1,852; France 752; West many 442.
Hoop and strip	117	434	Japan 355; Hong Kong 41.
Rails and accessories	6,758	1,687	All from Japan.
Wire	2,070	104	Japan 73; Hong Kong 29.
Tubes, pipes, fittings	8,326	3,794	Japan 1,933; Spain 1,179.
Castings and forgings, rough		1	All from Japan.
Lead:			
Ore and concentrate	7,935	2,375	All from Thailand.
Oxides		10	All from Hong Kong.
Metal including alloys, unwrought	3,047	6,491	All from Japan.
Magnesium: Metal including alloys, all forms	193	68	West Germany 32; Japan 20.
Manganese:			
Ore and concentrate	21,320	30,000	All from U.S.S.R.
Oxides	54	168	Japan 148.
Mercury 76-pound flasks	290	145	All from Singapore.
Molybdenum: Metal including alloys, all forms	1,030		
Nickel: Metal including alloys:			
Unwrought	660	637	All from Hong Kong.
Semimanufactures	261	2	Austria 1; Japan 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$169	$529	Japan $215; United Kingdom West Germany $147.
Silver: Metal including alloys, unwrought and partly wrought do.		$75	Japan $61; Australia $11.
Tin:			
Ore and concentrate	3	30	All from Hong Kong.
Oxides		2	All from Japan.
Metal including alloys:			
Unwrought	194	247	Hong Kong 123; Singapore 123
Semimanufactures	3	(3)	All from Japan.
Titanium:			
Oxides	56	34	Japan 21; Singapore 10.
Metal including alloys, all forms		18	All from Japan.
Tungsten:			
Ore and concentrate	149	488	Hong Kong 403; Singapore 85.
Metal including alloys, all forms	4	1	All from Japan.
Zinc:			
Oxides		6	Do.
Metal including alloys, all forms	50	47	Do.
Other:			
Ores and concentrates	103	12,579	Australia 10,777; Hong Kong
Oxides and hydroxides	122		
Base metals including alloys, all forms	264	74	Singapore 35; Hong Kong 20; J 18.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc		47	All from Italy.
Artificial: Corundum		58	Japan 40; Hungary 18.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$9	$14	All from Japan.
Grinding and polishing wheels and stones	(3)	28	Japan 22; Hong Kong 6.
Boron materials: Oxides and acids	66	79	All from Hong Kong.
Bromine including iodine and fluorine		24	Japan 22.
Cement	1	15	All from Singapore.
Clays, crude		14	Do.
Diamond:			
Gem, not set or strung value, thousands		$150	All from Belgium-Luxembour
Industrial stones do.	$134	$30	Switzerland $22; Japan $8.
Fertilizer materials:			
Crude, n.e.s		298	All from Japan.
Manufactured:			
Phosphatic		12	Do.
Potassic	99,100	23,000	All from U.S.S.R.
Unspecified and mixed		513	All from Japan.
Gypsum and plaster	21,312	23,000	All from Thailand.
Magnesium compounds: Magnesite, crude		36	All from Singapore.
Phosphates, crude	21,250		
Phosphorus, elemental		20	All from Japan.

See footnotes at end of table.

Table 6.—North Korea: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity		1985	1986[p]	Principal sources, 1986
INDUSTRIAL MINERALS —Continued				
Pigments, mineral: Iron oxides and hydroxides, processed		[3]		
Potassium salts, crude		11,000		
Precious and semiprecious stones other than diamond:				
Natural	value, thousands		$23	West Germany $10; Japan $8.
Synthetic	do.	$34	$20	Singapore $12; West Germany $8.
Salt and brine		329	296	All from Japan.
Sodium compounds, n.e.s.		613		
Stone, sand and gravel:				
Dimension stone, all forms		1,355	1,207	Italy 1,128.
Quartz and quartzite			12	All from West Germany.
Sulfur:				
Elemental, all forms		23,200	14,000	All from Poland.
Sulfuric acid		2		
Other: Crude		4	142	Japan 92; Singapore 32.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black		14	988	Hong Kong 633; Singapore 350.
Coal, all grades including briquets		103,416	128,380	All from Australia.
Coke and semicoke		38,660	104,490	Poland 88,000; Japan 16,490.
Peat including briquets and litter		221		
Petroleum refinery products:				
Gasoline	42-gallon barrels	3,485	274	Singapore 255.
Mineral jelly and wax	do.	3,566	1,866	Japan 1,078; Hong Kong 394.
Kerosene and jet fuel	do.	496	352	All from Japan.
Distillate fuel oil	do.	455	90	All from Hong Kong.
Lubricants	do.	2,001	26,463	Singapore 22,470; Japan 3,693.
Residual fuel oil	do.	33	372,020	Singapore 371,435.
Bitumen and other residues	do.		18,659	All from Singapore.
Petroleum coke	do.	8,283		

[p]Preliminary.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any exports of mineral commodities to North Korea during 1986.

[2]Excludes unreported quantity valued at $3,000 exported by Japan.

[3]Less than 1/2 unit.

LAOS[17]

Laos was one of the world's poorest countries, with an estimated 1987 per capita GDP of $140. The country contained only the beginning of an infrastructure. There were no railroads; the highway and telecommunications network was rudimentary, and only a small portion of the country had dependable electricity. Subsistence agriculture was the main occupation of most Lao people.

The mineral industry contributed very little to the economy. The most important mineral exports were gypsum and tin. The major foreign exchange earner was the sale of electric power to Thailand. The landlocked country of 3.5 million people was closely allied with the Soviet Union and Vietnam and relied heavily on foreign aid for its economic survival. Foreign aid contributions were estimated at about $150 million in each of the last few years. The list of principal donors included Australia, Japan, the Soviet Union, Sweden, and the United Nations. During the last few years the aid has been mainly for agricultural development and basic infrastructure. The resource and mineral-related aid was for expanding the Nam Ngum hydroelectric plant, developing the gypsum mine at Dong Heng in Savannakhet Province, and modernizing tin mining at Phon Tiou and Bo Neng in Khammouan Province.

Economic growth has improved recently, at least partly, because of a new economic management policy geared to decentralizing decisionmaking and relying more on market incentives. Industrial production increased as did overall trade. The trade deficit, however, also increased substantially during 1987. Inflation, which rose 65% in 1985 and 100% in 1986, declined to a much more tolerable increase of 25% in 1987.

Although mineral exploitation was minimal, the potential for significant develop-

ment was quite impressive. The Lao press reported an abundance of resources available to the nation and listed energy resources such as anthracite coal in Vientiane, Phong Saly, Luang Prabang, and Saravane Provinces; lignite in Xieng Khouang and Louang Namtha Provinces; and petroleum possibilities in the Savannakhet Plain. The article continued by describing the nonfuel minerals delineated during the last few years. There is hematite at Pha Yuan Mountain and magnetite at Pha Lek Mountain, both in Xieng Khouang Province. The Pha Lek magnetite deposit reportedly contains 1 billion tons of ore of more than 70% iron content. A potash deposit near Vientiane is a continuation of extensive potash deposits across the border in Thailand. Limestone is readily available throughout the country but major deposits were in Khammouan, Luang Prabang, and Vientiane Provinces. Also, reported for the first time, was a "glass mining factory"[19] at Houaisai in Bokeo Province. The reference presumably refers to a glass sand quarry and possibly a glass factory as well. Salt occurs in several provinces, but the most important salt mining operations were in Vientiane Province, with smaller mines in Savannakhet, Oudomsai and Phong Saly Provinces. In addition, bauxite, gold, lead, and zinc deposits have been discovered, but their estimated reserves have not been reported.

Table 7.—Laos: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal destinations, 1986
Aluminum: Metal including alloys, scrap	--	69	All to Thailand.
Copper: Metal including alloys, scrap	5	10	Do.
Iron and steel: Metal: Semimanufactures	158	--	
Zinc: Metal including alloys, scrap	6	--	

[p]Preliminary.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Laos, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any imports of mineral commodities from Laos during 1986.

Table 8.—Laos: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal sources, 1986
METALS			
Aluminum: Metal including alloys, all forms	1	3	All from Thailand.
Copper: Metal including alloys, all forms	20	1	Do.
Iron and steel: Metal:			
Ferroalloys:			
Silicon metal kilograms	130	--	
Unspecified	--	1	Do.
Steel, primary forms	--	2	Do.
Semimanufactures:			
Bars, rods, angles, shapes, sections	2,094	896	Do.
Universals, plates, sheets	4,807	5,138	Japan 5,130.
Wire	56	493	All from Thailand.
Tubes, pipes, fittings	201	586	Japan 378; Thailand 208.
Castings and forgings, rough	1	--	
Lead: Metal including alloys, all forms	2	[2]	All from Thailand.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	--	$1	Do.
Tin:			
Oxides	--	3	Do.
Metal including alloys, all forms	1	--	
Zinc: Metal including alloys, all forms	189	750	Do.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones	1	2	Do.
Cement	6,176	10,350	Do.
Chalk	[3]	--	
Clays, crude	6	--	
Fertilizer materials: Manufactured:			
Ammonia	2	5	Do.
Nitrogenous	3,950	850	Thailand 800; Japan 50.
Unspecified and mixed	150	250	Thailand 200; Japan 50.
Precious and semiprecious stones other than diamond: Natural kilograms	62	--	

See footnotes at end of table.

Table 8.—Laos: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal sources, 1986
INDUSTRIAL MINERALS —Continued			
Salt and brine	158	97	All from Thailand.
Sodium compounds, n.e.s.:			
Carbonate, natural and manufactured	--	27	Do.
Sulfate, natural and manufactured	386	--	
Stone, sand and gravel:			
Dimension stone, worked	30	13	All from Thailand.
Limestone other than dimension	68	--	
Sand other than metal bearing	--	8	Do.
Sulfur:			
Elemental: Colloidal, precipitated, sublimed	--	3	Do.
Sulfuric acid	1	18	Do.
Talc, steatite, soapstone, pyrophyllite	--	63	All from Norway.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	(3)	2	All from Thailand.
Coke and semicoke	--	3	Do.
Petroleum refinery products:			
Liquefied petroleum gas 42-gallon barrels	2	12	Do.
Gasoline do.	84,269	--	
Kerosene and jet fuel do.	62,132	--	
Distillate fuel oil do.	122,568	--	
Lubricants do.	8,717	56	Do.
Bitumen and other residues do.	12,490	--	

[p]Preliminary.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Laos, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any exports of mineral commodities to Laos during 1986.

[2]Unreported quantity valued at $1,000.

[3]Less than 1/2 unit.

MONGOLIA[19]

The mineral industry of Mongolia was an important part of its economy. Of the 12 minerals produced, coal, copper, fluorspar, and molybdenum were of particular importance. Copper, fluorspar, and molybdenum accounted for more than 35% of its exports during 1987.

The Government completed, at yearend, a major restructuring of its industrial management, condensing several agencies to increase efficiency and eliminate duplication of functions. The changes were part of Mongolia's effort to modernize its ailing economy and reduce its large trade deficit. In all, eight ministries or commissions were abolished and five new ones were formed. Those disbanded and pertinent to the mineral industry were the Ministry of Geological and Mining Industry and the Ministry of Fuel and Power Industry. The new ministries were the Ministry of Power, Mining, and Geological Industry and the Ministry of Natural Environmental Protection.

Environmental problems have become of such importance that they were placed at the Ministerial level. Dozens of years of uncontrolled lumbering on the Taal River watershed have increased the runoff and erosion and altered the flow characteristics of the river. This, in turn, has created a severe water shortage in Ulaanbaatar. Restoration of the forests in the upper reaches of the Taal River will be a primary task of the new ministry.

The economy grew 3.5% over that of 1986, as measured by the change in national income, and industrial production increased 4.7% over 1986. In recent years the industrial sector continued to gain in importance, providing 40% of national income and having a labor force twice as large as that of agriculture. Most of the sector's value was derived from the mineral industry.

A joint Soviet-Mongolian exploration team discovered a zeolite deposit in Mongolia. Zeolites are hydrated aluminum silicates of the alkali metals. Their unusual chemical properties make them valuable in various water treatment processes, odor control, and as a desiccant in industrial chemical reactions.

Additional copper-molybdenum deposits have been discovered adjacent to the Erdenet complex. Geologists believe the new deposits could double existing reserves.

Mongolia's trade was dominated by the U.S.S.R. and other member countries of the Council for Mutual Economic Assistance

(CMEA), which accounted for 96%. Its major exports were copper, fluorite, and molybdenum concentrates going to the U.S.S.R. The expansion of the Erdenet Mine to 20 million tons of ore per year should increase copper-molybdenum exports greater relative importance by 1990.

COMMODITY REVIEW

Metals.—Fifth-phase construction of the Erdenet complex got under way during the year. The joint Soviet-Mongolian copper-molybdenum mine was being modernized, and the mining capacity was being increased from 16 million to 20 million tons per year. Finland's Outokumpu Oy was negotiating with Erdenet for the modernization of the ore treatment plant in return for copper concentrate. Under the proposed barter arrangement, Outokumpu would take either 20,000 tons per year for 10 years or 40,000 tons per year for 5 years as payment. Overall, the fifth phase was to introduce new equipment and technology to improve ore extraction and processing capability, operating and energy efficiency, labor productivity, and the quality of the concentrate.

An economic problem discussed by Mongolia and the U.S.S.R. was the different pricing systems of the two economies. Financial results were dependent on whether rubles or tugriks were used. Annual profits of the Erdenet complex have been estimated to be as high as 600 million tugriks ($179 million).[20] Since the tugrik is not an internationally convertible currency, it is limited to a set exchange rate with the Soviet ruble. The Mongolian Government wanted the copper and molybdenum concentrate to be bought in a freely convertible currency that could be used to purchase foreign, non-Soviet, equipment vital to the country's development and modernization.[21] Together, copper and molybdenum concentrate has accounted for up to 40% of Mongolia's exports. Consequently, any adjustment in exchange rate and payment in a freely convertible currency would be significant to its economy.

Mineral Fuels.—The No. 4 heat and powerplant in Ulaanbaatar reportedly was completed. A minesite thermal powerplant apparently was also commissioned at year-end at the Bagn Nuur Mine. The mine was also being expanded to meet increased demand. In addition to supplying coal to the minesite plant, it supplied coal to Ulaanbaatar and for export.

The country's latest 5-year plan (1986-90) projected a rise in coal production from 6.5 million tons in 1985 to 8.0 million tons by 1990, and a 15% rise in annual electricity generation to 3,300 megawatt-hours. Part of the coal production increase would be used for electricity generation.

Further exploration was being done on the large Tavantolgoyt coking coal deposits in southern Gobi Province. The project was receiving assistance from other CMEA countries.

Table 9.—Mongolia: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal destinations, 1986
Aluminum: Metal including alloys, scrap	185	195	All to Yugoslavia.
Barite and witherite	10	--	
Cement[2]	--	13,300	NA.
Chromium: Oxides and hydroxides	--	3	All to Pakistan.
Copper:			
Ore and concentrate	--	7,338	All to Finland.
Sulfate	--	17	All to Japan.
Graphite, natural	--	18	All to Austria.
Iron and steel: Metal: Semimanufactures, universals, plates, sheets	--	92	All to Pakistan.
Stone, sand and gravel: Sand excluding metal-bearing	20	--	
Tin: Ore and concentrate	10	--	

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Mongolia, this table should not be taken as a complete presentation of this country's mineral exports. Unless otherwise specified, these data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any imports of mineral commodities from Mongolia in 1986.

[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

Table 10.—Mongolia: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal sources, 1986
Abrasives, n.e.s.: Grinding and polishing wheels and stones	--	4	All from Italy.
Aluminum: Metal including alloys, all forms	--	1	All from Austria.
Cement[2]	107,000	48,900	NA.
Coal: Anthracite and bituminous[2]	100	--	
Fertilizer materials: Manufactured:			
Nitrogenous[2]	13,800	14,000	NA.
Phosphatic (P_2O_5 content)[2]	22,100	19,000	NA.
Potassic	99,100	--	
Iron and steel: Metal: Semimanufactures[2]			
Tubes, pipes, fittings	11,300	11,500	NA.
Unspecified	63,900	74,400	NA.
Petroleum refinery products[2] thousand 42-gallon barrels	5,898	6,077	NA.
Salt and brine	2,729	--	
Sodium compounds, n.e.s.: Carbonate, natural and manufactured[2]	900	1,700	NA.
Stone, sand and gravel: Dimension stone, all forms	53	--	
Sulfur: Sulfuric acid[2]	1,100	1,400	NA.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Mongolia, this table should not be taken as a complete presentation of this country's mineral imports. Unless otherwise specified, these data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any exports of mineral commodities to Mongolia during 1986.

[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

NEPAL[22]

Mining and quarrying was estimated to contribute less than 0.25% of the GDP. There has been a modest but steady growth in the cement and building materials sector. Agriculture was the backbone of the economy, employing over 90% of the work force and contributing 60% of GDP and 75% of the revenue from exports. Much of Nepal's limited industrial activity involved processing the produce, accounting for 12% to 13% of GDP.

Development of the mining industry was hampered by a paucity of identified natural resources, extremely difficult exploration conditions, and an economy that generated little capital for investment and development. The mineral sector consisted mainly of magnesite and talc mining at Kharidhunga, limestone and cement production at two conventional plants and a miniplant, a small marble quarry at Godavari, and the slow development of a lead and zinc mine high in the mountains at Lare, north of Kathmandu.

Energy is a serious problem in the Nepalese economy. As in other developing countries, energy demand was growing fast. Consumption of energy in Nepal was estimated at 8.4 million tons of coal equivalence in fiscal year (FY) 1986,[23] a large increase from 6.3 million tons in FY 1985. Of the total, 95% came from traditional, noncommercial sources: 76% from fuel wood, 11% from agricultural waste products, and 8% from animal waste. Commercial sources accounted for 5%: 4% from petroleum products and the balance divided equally between coal and hydroelectricity.[24] Overcutting of timber for these needs resulted in environmental problems and caused the Government to look increasingly to other energy sources, especially its vast hydroelectric potential—approximately 83,000 megawatts. Hydroelectric development has been constrained because of high construction cost and the limited domestic market for large amounts of power. A national electricity grid was being developed which would expand power distribution and slow the rapid deforestation by replacing fuel wood for domestic and agriculture needs. New powerplants were also under construction to increase greatly the country's 203-megawatt capacity.

The proposed joint Karnali River hydroelectric project at Chisapani, under consideration by India and Nepal for more than a decade, had additional problems in 1987, mostly political. The dam and 3,500-megawatt powerplant would help control flooding in northern India and provide most of its power to India to offset Nepal's chronic trade deficit. The World Bank was plan-

ning to fund a more detailed feasibility study but India apparently favored a 2,000-megawatt plant at Pancheshwar, reportedly downriver, closer to the Indian border. The estimated cost of either project was $5 billion to $10 billion, which could take years to finance. Several other major hydroelectric projects were under consideration. Each would require considerable foreign assistance and cooperation from India, the major consumer of the power to be generated.

Nepal imported all of its petroleum product needs. The cost of these imports was 33% of the country's export value in 1987. A study of the petroleum potential of Nepal funded by the World Bank indicated possible deposits along its southern border. The Government awarded an exploration contract to a joint venture headed by Shell Exploration B.V. (Netherlands) covering 4,969 square kilometers in the Biratnagar area. The exploration work, begun in 1986, was still under way at yearend.

SINGAPORE[25]

The island state of Singapore is an international trade center in Southeast Asia. Its real GDP increased 8.8% after a recession during 1985-86, when the growth rates were minus 1.6% and 1.9%, respectively. Manufacturing, such as electronic products and components, electrical machinery, and textiles, led the economy, accounting for 44% of the growth, followed by construction and trade. The country has limited natural resources; economic development centered around the processing of imported raw materials, trade, shipping, and services. The principal exports of Singapore were machinery and equipment and mineral fuels. The United States received 30% of Singapore's exports. Investors supported the economy in 1987 by investing $800 million[26] to expand production capacity.

The only significant mining activities were producing 7.3 million tons of granite from small-scale quarries and manufacturing 1.5 million tons of cement from imported clinker. Iron and steel manufacturing from imported metal accounted for the metals sector's largest output in terms of value, and nonferrous metals manufacturing was the second largest.

Singapore remained the leading producer of refined oil in Southeast Asia despite low oil prices and sluggish international demand. There were five oil refineries in Singapore supplying petroleum products to the region. In 1987, Singapore processed an estimated 736,000 barrels per day of crude oil. Mobil Oil Co.'s Jurong oil refinery planned a $20 million expansion of reformer capacity to meet increased domestic demand for gasoline. A reformer produces gasoline having lighter constituents and a higher octane number. Esso Singapore Private Ltd. planned to invest $95 million in a visbreaker, a process for reducing the viscosity of heavy residual oils, at the Pulau Ayer Chawan oil refinery, which has a capacity of 230,000 barrels per day.

In a joint venture with Forasol-Foramer of France and Friede and Goldman, Singapore's Far East Levingston Shipbuilding Ltd. built a $50 million to $60 million offshore drilling rig in its shipyard. The high technology jack-up drilling unit was sold to Santa Fe International Corp. of the United States, an oil drilling company. Far East Levingston also received a contract from Conoco Inc. of the United States for fabricating a major part of an offshore oil platform with 7,000 tons of steel from regional suppliers.[27]

Table 11.—Singapore: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	37	7	--	All to Brunei.
Oxides and hydroxides	17,665	119,180	--	China 106,832; Malaysia 6,385.
Metal including alloys:				
Scrap	10,707	12,434	(2)	Japan 10,493; Pakistan 621.
Unwrought and semimanufactures	15,681	15,650	73	Malaysia 7,469; Australia 2,618; Hong Kong 707.

See footnotes at end of table.

Table 11.—Singapore: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	18	27	--	All to Australia.
Oxides and hydroxides	29	29	--	Malaysia 27.
Cobalt: Oxides and hydroxides	4	8	--	Malaysia 5.
Columbium and tantalum:				
Ore and concentrate, tantalite	3	393	--	Thailand 303.
Metal including alloys, all forms, tantalum kilograms	30	(3)	--	All to Japan.
Copper:				
Ore and concentrate	250	1	--	NA.
Matte and speiss including cement copper	16	--		
Metal including alloys:				
Scrap	21,726	23,757	92	India 10,457; Japan 7,939; Republic of Korea 2,337.
Unwrought and semimanufactures	9,537	12,284	1	Malaysia 9,901; Hong Kong 604.
Gold:				
Waste and sweepings kilograms	759	1,280	2	West Germany 750; Japan 306; United Kingdom 100.
Metal including alloys, unwrought and partly wrought troy ounces	63,691	132,750	129	Malaysia 58,450; Japan 33,823; West Germany 15,882.
Iron and steel:				
Ore and concentrate excluding roasted pyrite	21	19	--	All to Hong Kong.
Metal:				
Scrap	166,636	90,776	--	Thailand 37,758; Japan 34,244.
Pig iron, cast iron, related materials	3,599	1,413	--	Malaysia 1,293.
Ferroalloys	1,126	548	--	Malaysia 400; Australia 100.
Steel, primary forms	8,627	5,124	1	Malaysia 3,944; Taiwan 979.
Semimanufactures	353,001	369,760	102,845	Malaysia 125,752; Brunei 20,398; Japan 17,691.
Lead:				
Ore and concentrate	21	10	--	All to India.
Oxides	2,147	233	--	Malaysia 162; Japan 51.
Metal including alloys:				
Scrap	7,057	5,103	--	Taiwan 1,660; Malaysia 1,067; India 999.
Unwrought and semimanufactures	857	5,760	--	Malaysia 1,827; Thailand 1,553.
Magnesium: Metal including alloys, all forms	44	33	--	North Korea 16; Thailand 5.
Manganese:				
Ore and concentrate, battery-grade	21,954	23,565	--	Republic of Korea 4,303; India 3,650; Kenya 3,540.
Oxides	1,239	976	--	Malaysia 749; North Korea 120.
Mercury 76-pound flasks	290	174	--	North Korea 145.
Nickel:				
Matte and speiss	1	1,307	--	India 1,302.
Metal including alloys:				
Scrap	1,072	280	4	Japan 205; United Kingdom 44.
Unwrought and semimanufactures	2,480	2,714	--	India 2,531.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	8,456	1,800	--	Japan 1,093; United Kingdom 322.
Silver:				
Ore and concentrate[4]	(3)	--		
Waste and sweepings[4] kilograms	18,452	1,447	--	United Kingdom 1,146; Japan 192.
Metal including alloys, unwrought and partly wrought troy ounces	59,543	121,337	27,199	Malaysia 28,260; Thailand 9,099.
Tin:				
Ore and concentrate	9,728	4,892	120	Malaysia 2,728; Republic of Korea 785; Spain 761.
Ash and residue containing tin	1,012	571	--	Taiwan 291; West Germany 250.
Metal including alloys:				
Scrap	137	75	--	Taiwan 64.
Unwrought and semimanufactures	20,458	30,157	6,474	Japan 9,402; Netherlands 5,075; U.S.S.R. 1,800.
Titanium: Oxides	821	1,445	--	Malaysia 579; India 454; Japan 123.
Tungsten:				
Ore and concentrate	1,438	732	109	India 276; Hong Kong 152.
Metal including alloys, all forms	68	52	32	Italy 5; France 4.

See footnotes at end of table.

Table 11.—Singapore: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	2	42	--	Thailand 30; Malaysia 12.
Oxides	1,446	625	--	China 294; Japan 199.
Metal including alloys:				
Scrap	662	651	--	Taiwan 277; Japan 156; India 107.
Unwrought and semimanufactures	3,363	4,108	--	Malaysia 2,299; Netherlands 680.
Other:				
Ores and concentrates	245	388	--	Malaysia 170; Thailand 160.
Ashes and residues	31,362	49,310	--	Malaysia 25,303; Brunei 12,996; Philippines 6,501.
Base metals including alloys, all forms	83	144	--	Australia 76; North Korea 35.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	110	47	--	Malaysia 35.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$48	$1	--	NA.
Grinding and polishing wheels and stones	370	275	1	Malaysia 194; Thailand 28.
Asbestos, crude	7,117	4,276	--	Malaysia 1,273.
Barite and witherite	32,431	12,939	--	Malaysia 10,100; New Zealand 1,119.
Boron materials:				
Crude natural borates	18,986	10	--	All to Malaysia.
Oxides and acids	135	183	--	Malaysia 161.
Cement	307,287	66,927	--	Malaysia 35,167; Brunei 9,780; Republic of South Africa 6,778.
Chalk	2,359	2,781	--	Brunei 1,609; Malaysia 861.
Clays, crude	22,668	12,065	--	Malaysia 5,054; Philippines 1,849; Japan 1,590.
Diamond:				
Gem, not set or strung value, thousands	$15,151	$8,539	$1,217	Hong Kong $2,295; Malaysia $1,995; Belgium-Luxembourg $1,236.
Industrial stones do.	$444	$264	--	Hong Kong $128; Ireland $46.
Diatomite and other infusorial earth	202	115	--	Malaysia 71; Thailand 15.
Feldspar	4,314	3,585	--	Malaysia 3,278.
Fertilizer materials:				
Crude, n.e.s	46,069	40,654	--	Malaysia 40,570.
Manufactured:				
Ammonia	560	305	--	Malaysia 179; Thailand 68.
Nitrogenous	86,814	17,877	--	Malaysia 8,752; Philippines 3,970; Papua New Guinea 1,935.
Phosphatic	2,129	16,356	--	Republic of South Africa 14,446; Malaysia 1,649.
Potassic	174,015	141,368	--	Malaysia 52,882; Sri Lanka 47,267; Thailand 10,918.
Unspecified and mixed	57,964	54,128	--	Malaysia 48,135; Republic of South Africa 3,439.
Graphite, natural	91	77	--	Malaysia 73.
Gypsum and plaster	2,666	2,739	--	Malaysia 2,608.
Lime	5,081	2,919	--	Brunei 1,583; Malaysia 707; Guinea 528.
Magnesium compounds: Magnesite, crude including magnesia	245	172	--	Taiwan 108; North Korea 36.
Mica, all forms	226	62	--	Malaysia 31; Japan 9.
Nitrates, crude	74	555	--	Republic of South Africa 475.
Phosphates, crude	3,499	2,605	--	Malaysia 2,190.
Pigments, mineral: Iron oxides and hydroxides, processed	1,289	639	--	Malaysia 562.
Potassium salts, crude	330	--	--	--
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$5,337	$3,559	$10	Thailand $1,467; Switzerland $644; Hong Kong $413.
Synthetic do.	$209	$412	--	Thailand $214; Republic of Korea $87.
Pyrite, unroasted	4	--	--	--
Salt and brine	13,817	9,216	--	Malaysia 6,198; Brunei 2,677.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	4,688	1,387	--	Malaysia 1,297.
Sulfate, manufactured[5]	6,120	11,038	--	Malaysia 10,084.

See footnotes at end of table.

Table 11.—Singapore: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	217	233	--	Malaysia 199.
Worked	6,046	4,715	69	Malaysia 3,371; Brunei 470.
Dolomite, chiefly refractory-grade	22	1,268	--	Taiwan 963; Papua New Guinea 295.
Gravel and crushed rock	717	390	--	Malaysia 339.
Limestone other than dimension	234	86	NA	NA.
Sand other than metal-bearing	601	698	--	Malaysia 363; Brunei 164.
Sulfur:				
Elemental:				
Crude including native and by-product	7,338	15,885	--	Malaysia 12,454; Thailand 1,964.
Colloidal, precipitated, sublimed	7,051	10,600	--	Malaysia 5,529; Thailand 2,900; Philippines 1,780.
Sulfuric acid	2,581	1,743	--	Malaysia 1,157.
Talc, steatite, soapstone, pyrophyllite	832	512	--	Malaysia 510.
Other:				
Crude	17,220	5,379	--	Malaysia 2,149; Philippines 1,540; Thailand 1,502.
Slag and dross, not metal-bearing	11,150	7,480	--	Japan 5,741; Malaysia 1,411.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	20,135	19,387	--	Burma 6,571; Sri Lanka 4,086.
Carbon black	3,274	5,632	576	India 540; Japan 448; Malaysia 372.
Coal, all grades including briquets	478	1,607	--	Malaysia 1,270.
Coke and semicoke	14,731	17,462	--	Malaysia 13,829; Bangladesh 2,060.
Petroleum:				
Crude thousand 42-gallon barrels	622	649	--	All to Thailand.
Partly refined do.	829	689	516	Japan 153.
Refinery products do.	193,971	216,866	14,517	Japan 47,650; Malaysia 31,992; Hong Kong 33,110.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Unreported quantity value at $6,000.
[4]May include other precious metals.
[5]Includes hydrogen sulfate and pyrosulfate.

Table 12.—Singapore: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	410	20	--	China 10; Australia 5.
Oxides and hydroxides	48,702	103,137	428	Australia 101,491.
Metal including alloys:				
Scrap	771	845	50	Malaysia 503; Brunei 145.
Unwrought and semimanufactures	46,896	44,941	1,516	Australia 9,359; Japan 5,493; Malaysia 5,193.
Beryllium: Metal including alloys, all forms	--	12	--	Mainly from Japan.
Chromium:				
Ore and concentrate	19	8	NA	NA.
Oxides and hydroxides	220	151	74	United Kingdom 34; Japan 23.
Cobalt: Oxides and hydroxides	5	29	2	China 25.
Columbium and tantalum:				
Ore and concentrate, tantalite	68	(2)	--	NA.
Metal including alloys, all forms, tantalum	(2)	46	36	Finland 9.

See footnotes at end of table.

Table 12.—Singapore: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	5	12	—	United Kingdom 8.
Matte and speiss including cement copper	12	16	—	Malaysia 12.
Metal including alloys:				
Scrap	3,587	7,401	2,077	Malaysia 4,280.
Unwrought	2,249	5,660	118	Chile 3,157; Japan 1,856.
Semimanufactures	34,161	34,169	617	Japan 18,349; Malaysia 3,173; Taiwan 3,021.
Gold:				
Waste and sweepings: value, thousands	$1,442	$3,839	—	Malaysia $2,160; West Germany $829; Hong Kong $532.
Metal including alloys, unwrought and partly wrought: troy ounces	105,937	125,002	15,464	Japan 87,579; United Kingdom 16,654.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	12,581	10,167	—	All from Malaysia.
Metal:				
Scrap	65,402	209,091	174	United Kingdom 119,201; Australia 37,399; U.S.S.R. 28,068.
Pig iron, cast iron, related materials	46,614	60,015	57	U.S.S.R. 30,000; Mozambique 22,875.
Ferroalloys:				
Ferromanganese	6,186	3,183	—	Mozambique 2,974.
Ferrosilicon	1,940	2,718	—	Mozambique 1,080; Norway 981; China 460.
Unspecified	1,542	4,898	33	Australia 2,502; Mozambique 1,838.
Steel, primary forms	163,018	245,461	18	New Zealand 45,700; Netherlands 40,143; Malaysia 25,934.
Semimanufactures: thousand tons	1,349	1,289	8	Japan 697; Malaysia 112; Republic of Korea 107.
Lead:				
Ore and concentrate	20	1	1	
Oxides	274	381	1	Australia 211; China 55.
Metal including alloys:				
Scrap	104	133	12	Malaysia 63; Brunei 56.
Unwrought	5,457	9,673	49	Japan 6,939; Australia 1,386.
Semimanufactures	1,322	831	12	Australia 331; Taiwan 177; United Kingdom 132.
Magnesium: Metal including alloys, all forms	85	68	19	Japan 43.
Manganese:				
Ore and concentrate	35,923	28,846	—	Gabon 15,750; Brazil 9,846; Mexico 3,056.
Oxides	2,440	2,327	2	Japan 1,985.
Mercury: 76-pound flasks	735	928	377	China 464.
Nickel: Metal including alloys:				
Scrap	170	182	21	Malaysia 61; Philippines 32.
Unwrought	2,638	3,726	1	New Caledonia 1,971; France 1,559.
Semimanufactures	774	1,410	103	Japan 426; Norway 339.
Platinum-group metals: Metals including alloys, unwrought and partly wrought: troy ounces	34,240	17,394	—	West Germany 12,764; United Kingdom 965.
Silver:				
Ore and concentrate: value, thousands	—	$1	—	NA.
Waste and sweepings[3]: do	$341	$55	—	Hong Kong $21; Malaysia $13.
Metal including alloys, unwrought and partly wrought: thousand troy ounces	1,282	3,145	202	Australia 1,025; West Germany 666; United Kingdom 490.
Tin:				
Ore and concentrate	8,315	5,501	177	China 3,556; Burma 668.
Ash and residue containing tin	8,481	9,585	—	Malaysia 9,534.
Metal including alloys:				
Scrap	337	281	1	Malaysia 216.
Unwrought and semimanufactures	1,371	13,030	21	Thailand 6,629; Malaysia 5,236.
Titanium: Oxides	6,854	8,725	1,171	Japan 2,702; Australia 1,268; West Germany 996.
Tungsten:				
Ore and concentrate	1,699	1,235	—	Burma 1,057.
Metal including alloys, all forms	28	102	3	China 90.

See footnotes at end of table.

Table 12.—Singapore: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
METALS —Continued				
Uranium and/or thorium:				
Oxides and other compounds value, thousands	$111	$130	$25	France $84.
Metals including alloys, all forms kilograms	58	2	NA	NA.
Zinc:				
Ore and concentrate	—	40	9	Australia 14; Malaysia 13.
Oxides	568	957	38	China 302; Belgium-Luxembourg 144.
Metal including alloys:				
Scrap	415	221	—	All from Malaysia.
Unwrought and semimanufactures	10,980	13,277	224	Australia 6,251; Canada 2,983.
Other:				
Ores and concentrates	352	605	—	Burma 250; Malaysia 160.
Ashes and residues	114,576	177,613	—	Japan 157,465; Philippines 11,114.
Base metals including alloys, all forms	85	31	18	Thailand 7.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	437	516	371	Hong Kong 37; China 36.
Artificial: Corundum	37	30	—	China 18; Japan 12.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$51	$406	$320	France $68.
Grinding and polishing wheels and stones	1,704	2,350	48	China 1,208; Japan 465.
Asbestos, crude	6,078	3,987	91	Canada 2,090.
Barite and witherite	18,116	14,382	1,284	Malaysia 10,128; Thailand 2,157.
Boron materials:				
Crude natural borates	1,281	109	109	
Oxides and acids	573	498	88	Italy 292; China 64.
Cement thousand tons	2,701	2,103	(2)	Japan 697; Taiwan 532; Malaysia 459.
Chalk	3,865	5,735	3	Australia 1,498; United Kingdom 1,247; Thailand 1,148.
Clays, crude	50,186	60,625	34,509	Malaysia 13,672; United Kingdom 3,508.
Cryolite and chiolite	5	5	—	All from China.
Diamond:				
Gem, not set or strung value, thousands	$30,521	$39,843	23,535	India $14,943; Belgium-Luxembourg $10,457; Israel $8,057.
Industrial stones do	$1,522	$644	$45	Ireland $427; Iceland $61.
Diatomite and other infusorial earth	866	963	918	Malaysia 12.
Feldspar	5,992	4,413	31	India 2,428; China 1,262; Thailand 353.
Fertilizer materials:				
Crude, n.e.s.	3,703	778	—	Thailand 462; Australia 152.
Manufactured:				
Ammonia	772	621	4	Malaysia 212; Belgium-Luxembourg 178; West Germany 124.
Nitrogenous	79,860	5,256	23	West Germany 2,263; Malaysia 823; Australia 732.
Phosphatic	3,163	22,456	21,573	China 450; Republic of Korea 350.
Potassic	189,366	155,536	(2)	Canada 60,065; U.S.S.R. 58,100; Israel 15,804.
Unspecified and mixed	62,036	42,091	116	West Germany 33,854; Malaysia 2,484.
Graphite, natural	427	407	2	Japan 167; China 121; Republic of Korea 78.
Gypsum and plaster	97,845	56,130	191	Thailand 25,191; Australia 17,924; Malaysia 6,077.
Lime	11,208	5,010	—	Malaysia 4,452; China 300.
Magnesium compounds: Magnesite, crude including magnesia	791	472	18	Norway 255; Japan 154.
Mica:				
Crude including splittings and waste	1,220	496	84	India 253; China 100.
Worked including agglomerated splittings	54	17	(2)	Japan 14.
Phosphates, crude	5,219	4,920	—	India 1,630; Australia 1,400; Malaysia 1,198.
Pigments, mineral: Iron oxides and hydroxides, processed	2,948	3,058	561	West Germany 966; Japan 857; China 216.
Potassium salts, crude	1	30	—	All from Switzerland.

See footnotes at end of table.

Table 12.—Singapore: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$4,287	$2,834	$458	Hong Kong $778; Thailand $576; Sri Lanka $350.
Synthetic do	$688	$737	$107	U.S.S.R. $272; Thailand $183.
Pyrite, unroasted	—	43	31	NA.
Salt and brine	36,102	36,700	83	Thailand 11,087; Australia 6,723; China 6,091.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	5,288	347	20	East Germany 152; Australia 59; Japan 58.
Sulfate, manufactured[4]	7,652	20,748	16,226	Taiwan 2,140; China 1,614.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,275	1,228	1	Italy 654; China 206; Malaysia 157.
Worked	56,675	34,529	38	Italy 18,796; China 5,641; Portugal 2,562.
Dolomite, chiefly refractory-grade	1,192	127	37	Norway 62.
Gravel and crushed rock	779,438	697,463	11	Malaysia 696,126.
Limestone other than dimension	80,543	72,178	—	Malaysia 44,933; Japan 27,154.
Quartz and quartzite	126	172	—	Malaysia 89; China 49.
Sand other than metal-bearing thousand tons	1,203	1,205	1	Malaysia 1,192.
Sulfur:				
Elemental:				
Crude including native and by-product	34	142	9	China 70; Poland 54.
Colloidal, precipitated, sublimed	127	510	356	Poland 72; Republic of Korea 54.
Sulfuric acid	263	302	21	Malaysia 146; West Germany 104.
Talc, steatite, soapstone, pyrophyllite	3,986	6,205	235	China 4,278; Republic of Korea 533.
Other:				
Crude	39,753	32,489	—	West Germany 30,841.
Slag and dross, not metal-bearing	6,726	12,818	(2)	Taiwan 6,574; Japan 6,067.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,643	2,186	398	Japan 871; Republic of Korea 519.
Carbon black	4,523	4,621	351	Malaysia 2,271; West Germany 408.
Coal, all grades including briquets	2,148	1,825	878	United Kingdom 715.
Coke and semicoke	31,727	27,434	—	Japan 16,487; Australia 10,753.
Peat including briquets and litter	166	182	—	Netherlands 78; United Kingdom 42; Ireland 37.
Petroleum:				
Crude thousand 42-gallon barrels	218,831	236,830	—	Kuwait 50,954; Iran 49,561; China 47,014.
Partly refined do	2,378	2,732	—	Malaysia 2,251; Kuwait 480.
Refinery products do	71,278	79,340	4,338	Saudi Arabia 25,229; Kuwait 15,845; Bahrain 11,658.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include other precious metals.
[4]Includes hydrogen sulfate and pyrosulfate.

SRI LANKA[26]

Sri Lanka's mining industry produced around 18 minerals or mineral-based commodities during the year. The most important were cement, clays, gem stones, graphite, gypsum, mica, minerals associated with typical heavy mineral sands deposits, phosphate rock, salt, and rolled steel (from imported ingot and scrap). The value of mineral industry output, including the petroleum refinery sector, was 2% of GDP.

Economic performance in 1987 was the poorest since 1975 with real GDP growth dropping to 1.5% over 1986. Growth by sector varied widely. Agriculture, by far the most important part of the economy, declined 8% below 1986 while the value of factory industry output increased 8% over that of 1986. Drought was an important negative factor. A considerable amount of farmland was not planted in the north and east because of continuing civil disturbances in those areas.

Unemployment continued at a rate estimated at more than 20%. Prospects for a

rebound in economic growth in 1988 were good providing normal rainfall is received during the growing season.

Sri Lanka had a trade deficit of $658 million during 1987, a slight improvement over the $731 million deficit of 1986.[29] The major mineral exports were gem stones, graphite, and titanium, while fertilizer, petroleum, and steel raw materials were the most important mineral imports.

COMMODITY REVIEW

Industrial Minerals.—*Feldspar and Fluorspar.*—Exploration in the Matale District of Central Province by the Industrial Development Board has revealed, reportedly, rich deposits of feldspar and fluorspar. The Ceramic Corp. plans to increase its ceramic and porcelain production capacities. These new deposits could be important because Sri Lanka has never produced fluorite and has produced very modest quantities of feldspar.

Fertilizer Materials.—The 40-million-ton Eppawela apatite deposit has been underutilized because of the insoluability of the phosphate. Sri Lanka's scientists have reportedly perfected a technology for increasing the solubility of the phosphate radical using hydrochloric acid rather than more commonly used sulphuric acid. If commercially successful, the new process could allow Sri Lanka considerable savings in superphosphate import costs. The Sri Lanka Institute of Fundamental Studies was reportedly seeking local and foreign assistance to construct and operate a pilot plant. The Eppawela operation consisted of a mine and 15,000-ton-per-year grinding plant. The finely ground phosphate has been applied directly for perennial crops and trees. The State Mining and Mineral Development Corp. has applied to the Government for approval to increase the grinding capacity to 35,000 tons per year with funding from the Asian Development Bank.

Gem Stones.—The Sri Lankan Government was scheduled to sign an agreement with Thailand legalizing geuda exports for those who obtain special trading permits and would export through the Government's State Gem Corp. Geuda is a milky, rough form of the mineral corundum, formerly a waste material from gem stone pits. The Thai gem stone merchants discovered in the early 1970's that proper heating of geuda cleared the cloudiness and changed the color to blue, making it into sapphire. Smuggling of gem stones and geuda from Sri Lanka to Thailand had become so widespread that the Government sought to increase its revenue from the gem stone industry by signing the agreement with Thailand. At current exchange rates, legal gem stone exports have totaled as much as $50 million annually.

It has been common knowledge in the gem stone mining center of Ratnapura that the value of gem stones smuggled out of the country annually has been several times that of legal exports. The Government has not announced the value but conceded that there were "vast quantities" of gem stones illegally exported.[30]

Geologists testing alluvial gravel in the Koslanda area have identified potentially gem-quality diamond deposits. The reports have attracted prospectors and speculators from all over the world. The main area of interest was along the Menick Ganga in the Central Province close to the Diyaluma waterfall, a famous tourist attraction.

Graphite.—To improve the production and export potential for its Bogala and Kahatagala graphite mines, the Government-owned Mining and Mineral Development Corp. reportedly expended $18 million between 1982 and 1987. Much of the cost was financed by the Asian Development Bank. Orders were received for more than 3,000 tons of graphite for 1988 compared with 1,000 tons for 1987. Most of the increase was for refractory-grade graphite from the Kahatagala and adjacent Kolongaha Mines. The mines had a considerable stockpile of graphite because of insufficient demand.[31]

Mineral Sands.—Late in 1987, the National Aquatic Research Agency reported the discovery of monazite-bearing mineral sands on the continental shelf along the northern and southwestern coasts. The placer deposits are at a depth of 10 to 15 meters about 8 kilometers offshore. These deposits can be mined easily with conventional dredging equipment.[32] Monazite was recovered as a byproduct of mineral sands at Pulmoddai on the northeast coast, where ilmenite, rutile, and zircon were major economic minerals.

Mineral Fuels.—A Single Point Buoy Mooring system was installed 9.2 kilometers off the coast near Sapugaskanda and was connected to shore during 1987 with a 914-millimeter pipeline. The buoy system allowed deepdraft tankers to unload crude oil directly without transshipping or lightering. The land terminus of the pipeline is

Orugodawatta, where four 290,000-barrel crude oil storage tanks were under construction at yearend. The oil will be pumped from these tanks through a 610-millimeter pipeline to the refinery at Sapugaskanda. The $36 million project was expected to save $7.5 million per year in freight charges. The Ceylon Petroleum Corp. planned to modernize the refinery by broadening its range of products and increasing its liquefied petroleum gas capacity. Tenders were to be offered during the last half of 1987.

VIETNAM[33]

The most important event of the minerals industry was the rapid development of the Bach Ho offshore oilfield, 160 kilometers southeast of Ho Chi Minh City. The reserves were not revealed, but the Vietnamese and Soviet Governments were confident enough to begin priority construction of a 60,000-barrel-per-day oil refinery at Tuy Ha. If production increases as planned, the value of the petroleum would surpass by 1990 that of any other mineral commodity produced in Vietnam.

Economic problems continued. The GDP was one of the lowest in the world at $100 per capita. Unemployment was 30%; the foreign debt was between $6 billion and $7 billion; and the inflation rate was in the triple digits. To improve the economy, the National Assembly passed in December a foreign-investment law to attract Western capital and businesses. Under this law, foreign investors may have 100% equity in any venture. They can set up joint ventures with a minimum of 30% foreign capital. The tax on profits would range from 15% to 25%, and the nationalization of foreign property would be prohibited. A tax holiday may be granted for important projects for 2 years followed by a 50% reduction for another 2 years.

Vietnam was believed to have exploitable deposits of bauxite, coal, chromite, gold, iron ore, tin, and titanium. The lack of funds and expertise has prevented their exploitation. The Government was hoping that foreign investment would be available for developing some of these deposits. In the long run, Vietnam's success in attracting foreign investors will depend primarily on the flexibility and cooperation of the Government.

The U.S.S.R. was Vietnam's biggest trading partner, accounting for 80% of Vietnam's imports. The most important of these were fertilizer, fuel, machinery and equipment, and rolled steel. Vietnam's exports, again mostly to U.S.S.R., were primarily nonminerals, including coffee, fruit, lumber, rubber, and tea. Mineral exports were not large but of potential importance. Between 500,000 and 700,000 barrels of crude oil were exported during 1987. About 500,000 tons of anthracite and a few hundred tons of tin metal were the other most significant mineral exports. Gypsum for the cement industry was supplied by Laos.

Balance of payment and increasing trade deficits caused problems for the economy. Exports increased by 8%, while imports 14%. Plans were to increase exports 17% in 1988 and hold imports to a practical minimum.

The Government has a continuing program to gather basic geological data both onshore and offshore along its 3,444-kilometer coastline. The offshore work was being assisted financially and technologically by the U.S.S.R. The Institute of Pacific Oceanography of the Soviet Academy of Sciences was the major group working with and training scientists from the Institute of Oceanography of the Vietnam Institute of Science. Geological and geophysical surveying and mapping of the continental shelf have been performed. The topography of the seafloor has been mapped and cross sections of the underlying structure were prepared. The work has produced not only accurate data for further mineral resource evaluation but also a cadre of well-trained has produced a cadre of well-trained Vietnamese scientists versed in modern oceanography techniques.[34]

Onshore exploration was to be strengthened through an agreement with the Government of Czechoslovakia to aid in geological surveys and exploration during 1988-90.

The General Department of Mines and Geology's mineral analysis capability reportedly was enhanced by doubling the Dalat Atomic Research Institute's nuclear reactor capacity to 500 kilowatts. The institute produced radioactive isotopes for medical and analytical testing. The content of copper, gold, silver, and other metals in soil samples can now by determined at the institute. These analyses have been performed previously in other countries.

COMMODITY REVIEW

Metals.—The bauxite mines in Bao Loc District, Lam Dong Province, have been entirely mechanized and the ore grade has improved from a concentrate of 43% to one of 46% aluminum oxide content. The grade improvement could indicate the installation of a washing plant as part of the mechanization. The small mine furnishes bauxite for chemicals and abrasives.

Construction of a 22,000-ton-per-year "soft iron" plant at the Thai Nguyen iron and steel complex was completed. The plant began operating in November, 1 year ahead of schedule. It was designed and built completely by personnel at Thai Nguyen. The Vietnam press did not provide a definition of "soft iron" but stated it was the first of its kind in the country. The soft iron would be used in electric furnaces for producing steel ingot.

Industrial Minerals.—*Cement.*—The Federation of Cement Enterprises reported that production of 1.5 million tons of portland cement in 1987 was the highest ever. Despite the record high, serious problems still remained. The industry had an installed capacity of 3.4 million tons per year. Raw material shortages and transportation were the major causes for low capacity utilization of two modern rotary-kiln plants. A Nhan Dan newspaper editorial detailed how poor planning resulted in the 1-million-ton-per-year facilities having inadequate limestone, other raw materials, energy supplies, communication, transportation, bag filling capacity, and warehousing. "Careful efforts were not made from the very beginning to train, develop, and prepare a technical and professional force of managers and operators and to repair equipment," the editorial said.[35] There have been other press references to a rapid decline because of poor maintenance and the need for a large investment to regain capacity.

A 5,000-ton-per-year vertical kiln cement mill began operating in December at Chieng Pac, Thuan Chan District, Son La Province. Many of the plant components were made locally. These cement minimills are scattered throughout the country and have an aggregate capacity of 500,000 tons per year. Output from the plants depends largely on the availability of electric power and fuel.

Fertilizer Materials.—The Soviet Union has been assisting in the improvement of the Lao Cai apatite mine in Hoang Lien Son Province. A total of 25 main projects have been completed in the long-term rebuilding of the mine facilities, which were severely damaged during a border dispute with China in February 1979. Nearly 90,000 cubic meters of concrete have been poured and 1,000 tons of equipment has been installed for recent projects. A new electric power system was under construction as were railroad facilities. An ore dressing mill was under construction at yearend to process low-grade ore that had been underutilized or discarded for years. No details were available about the type and capacity of the mill.

The Vietnamese press reported plans for the country's second superphosphate plant. It was to be located in Long Thanh, 25 kilometers east of Ho Chi Minh City, and have a capacity of 45,000 tons per year.

Because the agriculture sector commands the highest priority in economic planning, fertilizer production is of critical importance. An article in the Hanoi press in December described the phosphate fertilizer industry and the nature of severe and persistent problems of production and distribution.[36] The target for superphosphate production at Lam Thao was 310,000 tons in 1987. However, each step in the production process had problems. Domestic pyrite production was inadequate and sufficient imports could not be obtained because of a lack of foreign exchange. Pyrite from Albania was delivered late. The next most serious problem was transportation. Local raw material movement was hampered by a shortage of railcars and trucks for highway use. Although 135 railcars were needed daily to transport apatite to Lam Thao, only 85 to 90 were available. Distribution of the phosphate fertilizer went no smoother than production. Rail distribution was less than 50% of that planned. The truck shortage prevented the railroad shortfall from being delivered by highway. Undelivered fertilizer was a problem because, without warehouses, it was stacked outside where it washed into a river when it rained. Transportation losses were as high as 30%, with pilferage accounting for most. The other problem was the quality of the phosphate. Open storage of single superphosphate caused the P_2O_5 content to leach from the standard of 16.5% to less than 9% in many cases.

Mineral Sands.—The Vietnamese press announced plans for building a 20,000-ton-per-year ilmenite recovery plant. Titaniferous sand deposits, 0.5 to 1.0 meter thick

and 15 to 30 meters wide, have been identified along the coasts of Binh Tri Thien, Nghia Binh, and Phu Khanh Provinces. The Binh Tri Thien deposits have the highest zirconium content and extend 60 kilometers along the coast. The Vietnamese will probably require assistance for plant design.[37]

Sulfur.—Five organizations, including one from the Soviet Union, were involved in enlarging the Giap Lai iron pyrite mine in Vinh Phu Province. The work was being done also to improve efficiency and reduce supplies and fuel consumption.

Mineral Fuels.—*Coal.*—The production target of 6.1 million tons was met in 1987. The goal was met despite such problems as a lack of construction capital, a shortage of spare parts, a poor transportation system, and a shortage of electric power. Of greater concern was the gradual deepening of the mines and the resulting higher cost of production. In major Hong Gai coal mines during the 1970's the stripping ratio was 3 to 4 cubic meters of overburden for each ton of coal, whereas in 1987, twice the amount of overburden removal was necessary. In many cases, mining was still done with the same equipment as that of the 1970's. Similarly the underground mines were deeper as the upper levels have been worked out. Coal was one of Vietnam's major exports, but the output of high-quality coal demanded by foreign clients was falling, making the quality more difficult to maintain. A Hong Gai Coal Co. representative stated that production could not be increased without improving technology and finding new, presumably shallower, deposits. Labor relations and morale were of concern to management. Miner salaries were not much higher than other workers. The company representative stated that difficult and dangerous working conditions underground should justify a much higher wage scale. Ironically because of financial problems, miners received one-half their salary during the fourth quarter of 1987 and nothing in January 1988.

The coal sector has long been a recipient of much of the Soviet Union's technical and financial aid. The aid accounted for more than 85% of the nation's coal production capacity. Another technical cooperative agreement was being prepared for 1988-90. The draft agreement contained the following main provisions: Maintain production at six major mines and two large equipment maintenance plants, build coal region infrastructure to increase efficiency, expedite existing projects and postpone several projects until investment capital becomes available. Some of the projects were as follows: the creation of an Institute of Economics and Coal Planning; a 960-seat vocational school at Cam Pha; production coordination between the ministry and mines; central storehouses to protect equipment and materials; a 500-bed hospital for coal workers; cultural centers for workers at the Coc 6 Mines; additional research equipment for the Mining Institute; and housing and cultural amenities in the mining regions.

Petroleum.—Vietnam's embryonic petroleum sector was one of the few sectors of the mineral industry that was progressing as planned. The joint Soviet-Vietnam venture, Vietsovpetro, began crude production at its No. 4 offshore platform in August, 2 months ahead of schedule. The No. 5 platform was installed and nearly ready for drilling.

Construction workers at the oil support base at Vung Tau have increased their proficiency with each new platform. The No. 6 platform jacket was assembled in 2 months, 10 months quicker than the No. 1 platform jacket. Much time was saved by doing some of the heavy welding onsite, rather than waiting for preformed and welded parts from the U.S.S.R.

Crude production increased as the new platforms were brought into operation. Production capacity was estimated to be 6,000 barrels per day by yearend. The average output, however, was probably less because production reportedly ceased during inclement weather.

Vietsovpetro scheduled 19 exploratory wells and a production of 5 million barrels of crude oil for 1988.

The Oil Refinery Construction Corp. of the Ministry of Building has completed preliminary site preparation, 50,000 square meters of roads and storage yards, and 10,700 square meters of worker housing at the Tuy Ha Oil refinery, which is halfway between Vung Tau and Ho Chi Minh City. Initial capacity of the refinery was to be 60,000 barrels per day with a capability to double that.

A mini-oil refinery was being constructed by Saigon PETRO, a joint venture of four Vietnamese organizations, at Cat Lai, Thu Duc District on the outskirts of Ho Chi Minh City. The refinery was to have a capacity of 1,000 barrels per day and apparently function as a topping plant and refinery research facility for domestic crude oil. Completion was scheduled for early 1988.

[1]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[2]U.S. Embassy, Dhaka, Bangladesh. State Dep. Airgram A-20, Oct. 13, 1987, p. 1.
[3]Fertilizer Focus (Surrey). V. 4, No. 12, Jan. 1988, p. 34.
[4]Oil & Gas Journal (Tulsa). V. 86, No. 9, Feb. 29, 1988, pp. 76-82.
[5]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[6]U.S. Embassy, Bandar Seri Begawan. State Dep. Airgram A-3, Sept. 21, 1987, p. 15.
[7]Values have been converted from Brunei dollars (B$) at the rate of B$2.10 = US$1.00.
[8]Journal of Commerce. V. 376, No. 26,612, Jan. 15, 1988, p. 10B.
[9]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[10]Hanoi Vietnam News Agency Broadcast. 0558 GMT, Jan. 5, 1988.
[11]———. Vietnam News Agency Broadcast. 1453 GMT, May 13, 1987.
[12]By Travis Q. Lyday, physical scientist, Division of International Minerals.
[13]By E. Chin, physical scientist, Division of International Minerals.
[14]Where necessary, values have been converted from Hong Kong dollars (HK$) to U.S. dollars at the rate of HK$7.815 = US$1.00 in 1987.
[15]By Chin S. Kuo, physical scientist, Division of International Minerals.
[16]Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W0.94 = US$1.00 for 1987.
[17]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[18]Vientiane Mai in Lao (Vientiane). Nov. 24, 1987, p. 1.
[19]By Gordon Kinney, physical scientist, Division of International Minerals.
[20]Where necessary, values have been converted from Mongolian tugriks (Tug) at the rate of Tug3.35 = US$1.00.
[21]Far Eastern Economic Review (Hong Kong). V. 137, No. 34, Aug. 20, 1987, p. 65.
[22]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[23]The Nepalese fiscal year begins in mid-July of the year stated.
[24]U.S. Embassy, Kathmandu, Nepal. State Dep. Airgram A-01, Jan. 25, 1988, p. 7.
[25]By Chin S. Kuo, physical scientist, Division of International Minerals.
[26]Where necessary, values have been converted from Singapore dollars (S) to U.S. dollars at the rate of S$2.11 = US$1.00 for 1987.
[27]American Metal Market. Nov. 16, 1987, p. 2.
[28]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[29]Where necessary, values have been converted from Sri Lankan rupees (Rs) to U.S. dollars at the rate of Rs29.44 = US$1.00 for 1987.
[30]Asian Wall Street Journal. V. 9, No. 234, Aug. 1, 1987, p. 1.
[31]Mining Magazine. V. 158, No. 2. Feb. 1988, p. 1.
[32]Industrial Minerals. No. 248. May 1988, p. 77.
[33]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[34]Hanoi Nhan Dan in Vietnamese, July 23, 1987, p. 3.
[35]———. Editorial: Intensive Investment, Creation of Stability for Cement Production. Jan. 14, 1988, p. 1.
[36]Ha Thi. Phosphate Fertilizer for Agriculture—Long Wait for Imported Raw Materials, Big Losses During Shipping. Hanoi Nong Nghiep (in Vietnamese), Dec. 5, 1987, p. 4.
[37]Hanoi Vietnam Courier (in English). Feb. 1988, p. 3.

Table 13.—Vietnam: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal destinations, 1986
METALS			
Aluminum: Metal including alloys, all forms	94	17	All to Hong Kong.
Chromium: Ore and concentrate	1,664	198	All to Japan.
Copper: Metal including alloys, all forms	4,605	1,175	All to Hong Kong.
Iron and steel: Metal:			
Scrap	55,477	82,936	All to Japan.
Semimanufactures	140	2,068	All to Thailand.
Tin: Metal including alloys, unwrought	13	70	Japan 50; Hungary 20.
INDUSTRIAL MINERALS			
Diamond: Industrial stones value, thousands	$28	—	
Mica: Crude including splittings and waste	10	—	
Precious and semiprecious stones other than diamond: Natural value, thousands	$14	$42	All to Italy.
Salt and brine	1,674	310	All to Hong Kong.
Stone, sand and gravel:			
Dimension stone, all forms	66	1,433	Hungary 1,432.
Sand excluding metal-bearing	390	—	
MINERAL FUELS AND RELATED MATERIALS			
Coal: Anthracite and bituminous	198,800	131,093	Japan 93,624; Belgium-Luxembourg 20,112; France 11,075.

[p]Preliminary.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Vietnam, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any imports of mineral commodities from Vietnam during 1986.

Table 14.—Vietnam: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986[p]	Principal sources, 1986
METALS			
Aluminum: Metal including alloys, all forms	322	1,216	Hungary 942; Japan 233.
Chromium: Oxides and hydroxides	(2)	22	All from Japan.
Cobalt: Oxides and hydroxides		13	Hong Kong 10; Japan 3.
Copper: Metal including alloys, all forms	127	522	Poland 391; Hong Kong 169.
Iron and steel: Metal:			
Pig iron, cast iron, related materials	90		
Ferroalloys	250	483	Japan 376; France 97.
Steel, primary forms		9	France 6.
Semimanufactures:			
Bars, rods, angles, shapes, sections	14,124	10,616	Poland 6,810; Japan 1,970; Sweden 868.
Universals, plates, sheets	9,640	9,655	Japan 6,311; Poland 1,372; Hungary 805.
Hoop and strip	524	588	Japan 497; Belgium-Luxembourg 61.
Rails and accessories	41	23	All from United Kingdom.
Wire	1,516	1,028	Japan 981; Sweden 27.
Tubes, pipes, fittings	357	11,404	Japan 10,644; Sweden 495.
Lead:			
Oxides	7	20	All from Japan.
Metal including alloys, all forms	208	54	Hong Kong 50.
Magnesium: Metal including alloys, all forms	1		
Manganese: Oxides	113	194	Hong Kong 144; Japan 50.
Nickel: Metal including alloys, all forms	5	7	Sweden 4; Japan 3.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$16	$93	Japan $92.
Titanium: Oxides	73	463	Hong Kong 245; Japan 218.
Tungsten: Metal including alloys, all forms kilograms		52	All from Japan.
Zinc:			
Oxides	48	586	Hong Kong 528; Japan 58.
Metal including alloys:			
Unwrought	190	300	All from Poland.
Semimanufactures	1		
Other: Ores and concentrates	25		
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc.		89	All from Netherlands.
Artificial:			
Corundum	4	31	All from Hungary.
Silicon carbide	4		
Grinding and polishing wheels and stones	1	3	All from Japan.
Asbestos, crude	5	105	All from Canada.
Cement	8,163	3,765	Hong Kong 2,748; Philippines 1,000.
Clays, crude		8	All from Sweden.
Diatomite and other infusorial earth	(3)	60	All from Japan.
Fertilizer materials: Manufactured:			
Ammonia	72	13	Do.
Nitrogenous	578,534	229,600	U.S.S.R. 217,600; Bulgaria 12,000.
Phosphatic		10,000	All from Philippines.
Potassic	79,673	81,603	U.S.S.R. 81,600.
Unspecified and mixed	11,531	366	Japan 220; Sweden 146.
Gypsum and plaster		1	All from Italy.
Magnesium compounds: Oxides and hydroxides	20	20	All from Hong Kong.
Mica: Worked including agglomerated splittings		3	All from Japan.
Pigments, mineral: Iron oxides and hydroxides, processed		76	Japan 75.
Pyrite, unroasted	38,000	60,000	All from U.S.S.R.
Sodium compounds, n.e.s.:			
Carbonate, natural and manufactured	9,867	4,980	France 2,500; Japan 2,260.
Sulfate, natural and manufactured	3,839	3,128	Hong Kong 3,124.
Stone, sand and gravel: Dimension stone, all forms	480	40	All to Italy.
Sulfur:			
Elemental, all forms	13,058	7,020	Poland 7,000.
Sulfuric acid	112	5	Mainly from Hong Kong.
Talc, steatite, soapstone, pyrophyllite	16	2	All from France.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	1,711		
Carbon black	392	459	Japan 356; Hong Kong 75.
Coal: Anthracite and bituminous	28,955	30,844	All from Australia.
Coke and semicoke	5,850	2,400	All from Japan.

See footnotes at end of table.

Table 14.—Vietnam: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity		1985	1986[p]	Principal sources, 1986
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products:				
Gasoline	42-gallon barrels	145	---	
Mineral jelly and wax	do.	3,502	2,267	Hong Kong 1,747; Japan 394.
Kerosene and jet fuel	do.	81,321	19,656	Italy 19,631.
Distillate fuel oil	do.	1,612,143	119	Finland 67; West Germany 52.
Lubricants	do.	201,239	39,242	Italy 32,998; Japan 4,196.
Residual fuel oil	do.	897,362	---	
Bitumen and other residues	do.	16,374	3,531	Hong Kong 2,727; Finland 788.
Bituminous mixtures	do.	588	12	All from Japan.

[p]Preliminary.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Vietnam, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from United Nations information and data published by the trading partner countries. The United States did not report any exports of mineral commodities to Vietnam during 1986.

[2]Unreported quantity valued at $2,000 exported by France.

[3]Unreported quantity valued at $3,000 exported by Japan.

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